

April 17th, 1877.

Osbert Salvin, Esq., F.R.S., V.P., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of March 1877.

The total number of registered additions to the Society's Menagerie during the month of March was 118, of which 53 were by presentation, 7 by birth, 43 by purchase, 12 were received on deposit, and 3 by exchange. The total number of departures during the same period, by death and removals, was 76.

The most noticeable additions during the month of March were as follows:—

1. A collection of rare Himalayan Passeres, purchased March 8, embracing examples of the following ornamental species, new to the Society's Collection, viz. *Megalæma hodgsoni*, *Grammatoptila striata*, *Sibia capistrata*, and *Hemixos flavala*.

2. Two young male Orang-outangs (*Simia satyrus*), presented March 13, by Dr. R. Sim, F.Z.S.

A letter was read addressed to the Secretary by Mr. A. Welles, of Christchurch, New Zealand, giving an account of the success which had attended the endeavours of the Acclimatization Society of that colony to introduce Salmon into New Zealand from the U. S. of America.

Mr. Sclater exhibited specimens of the young Anacondas which had been produced dead by the large female of this Snake purchased on the 15th of February 1877.

Two young had been produced on the 2nd inst., and one other subsequently; but it seemed probable that more would follow.

Another member of the Boidæ that had produced young ones (already extruded from the egg) in the Gardens was stated to be the Yellow Boa of the Antilles (*Chilobothrus inornatus*).

Mr. Sclater called attention to two large photographs of the young Gorilla (*Trogloodytes gorilla*) now living in the Aquarium at Berlin, which had been kindly forwarded to the Society by the authorities of that Institution.

This animal had been obtained by Dr. Falkenstein, of the German West-African Expedition, on the 2nd of October 1875, at Ponta Negra (about two days' journey inland from Chincoxo) on the West-African coast, from a Portuguese. The Portuguese had received it from a negro, who had shot the mother a few days before and captured the young one. Dr. Falkenstein had brought the animal with him to Berlin, and sold it to the Berlin Aquarium on the 30th of June 1876, for 20,000 marks (£1,000) which went to the benefit of the Expedition.

On its arrival in Berlin the Gorilla weighed 30 lb. (German); it

was now stated to weigh 43 lb., and to be in excellent health and condition, although it had been twice seriously ill.

Mr. Selater took this opportunity of recording the fact that this was not the first living example of the Gorilla that had been brought to Europe alive, as was shown by the following note from Mr. A. D. Bartlett, the Superintendent of the Society's Gardens :—

“In the year 1861, I saw in the collection of the late Mr. Chas. Waterton a mounted specimen of a young Gorilla. It had been prepared from an individual that had been exhibited alive in the No. 1 Collection of Wombwell's travelling menagerie, where it had lived upwards of 7 months¹.

“Mrs. Wombwell's daughter subsequently lent me a photograph of this animal, which had been taken during its lifetime. This photograph I showed to Prof. Owen, and afterwards lent to Mr. Wolf, who, I believe, used it to assist him in a drawing of the Gorilla. About two years since I sent the photograph back to the owner (Mrs. Fairgrieve), who was then living at Lauriston in Edinburgh.”

Mr. Selater exhibited the very beautiful chalk drawing by Mr. Wolf (see Plate XXXV.) which had been prepared from the photograph in question, and pointed out that there could be no doubt that Mr. Bartlett's statement of the animal having been a young Gorilla was correct. Mr. Waterton's collection was, he believed, now at Ushaw College, Durham, where, no doubt, the stuffed specimen was still to be seen.

The following papers were read :—

1. On the Bursa Fabricii in Birds.

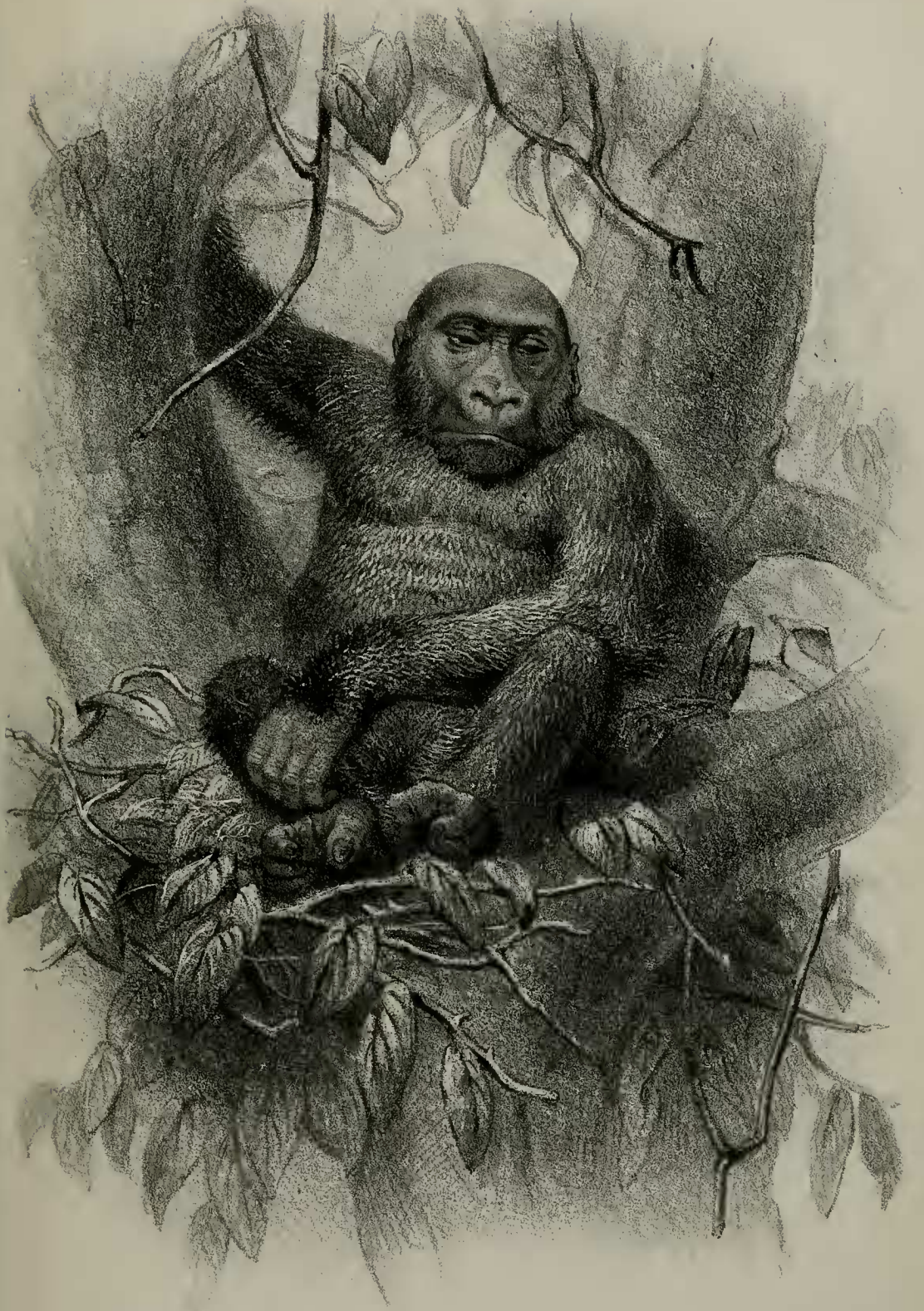
By W. A. FORBES, F.Z.S.

[Received March 13, 1877.]

Prof. Garrod, in his paper on *Plotus ankinga* (P. Z. S. 1876, p. 344) says :—“In the urino-genital system of *Plotus ankinga*, in both sexes, the ducts open in the normal manner into the cloaca, just above its lower orifice. This orifice, however, is not on the surface, but is into a cavity behind the cloaca, which opens externally quite close to the place where the two communicate. Except for the nearly marginal orifice, the second cavity is a cæcal sac, oval in shape, and about 1½ inch high, covered at its blind end with the crypts of shallow glands, which also run down its sides. That it is a modification of the *bursa Fabricii* cannot be doubted.”

The disposition of the parts described above seemed peculiar enough to be worthy of further investigation ; with that end my kind friend Prof. Garrod requested me to undertake a series of observations on the bursa in other birds, in order to throw further light on the structure of this organ, and to discover what characters, if any, it afforded for classificational purposes. The ample materials of the

¹ Cf. Gray, P. Z. S. 1861, p. 278.



J Wolf del. J Smit lith

M & N Hanhart imp.

TROGLODYTES GORILLA.



Prosecutor's department have given me opportunities for examining this organ in a considerable number of species of birds of various orders; and though I regret to say my investigations have not turned out so satisfactorily as regards taxonomic characters as I had hoped, I venture to bring such results as I have obtained before the Society this evening. As the subject of the bursa Fabricii has hardly attracted any notice in this country since the days of Harvey, I have added to my own notes a brief résumé of the most important observations and opinions as regards its structure and functions that have been brought forward by foreign anatomists.

The organ in question seems first to have been noticed by the naturalist whose name it bears, Fabricius of Acquapendente. In his treatise 'De formatione ovi et pulli'¹, p. 5, he says:—"Tertium quod in podice est adnotandum est duplex vesicula quæ in ima ejus parte ad os pubis supereminet, et conspicua exteriorque apparet, simulatque uterus jam propositus conspectui sese offert: quæ cum sit pervia, ita ut ab ano ad ipsum uterum et ab utero in ipsam, ut puta superius, infra foramen pateat, ex altero autem extremo clausa sit, hunc existimavimus esse locum, in quem gallus semen immittit porrigitque ut inibi servetur." From this and other passages in his works it is clear that he considered its function that of a *receptaculum seminis* in the female; its use in the male, on such a theory, he does not explain. Harvey, in his work 'De Generatione Animalium' (London, 1651), as quoted in the Sydenham Society's translation of his works (1847, p. 183), refutes Fabricius's ideas on this point. "The foramen into which Fabricius believes the Cock to inject his fluid, is discovered between the orifices of the vulva and the rump. I, however, deny any such use to this foramen; for in young chickens it is scarcely to be seen, and in adults it is present indifferently in males and females. It is obvious therefore that it is both an extremely small and obscure orifice, and can have no such important function to fulfil; it will scarcely admit a fine bristle and needle, and it ends in a blind cavity; neither have I ever been able to discover any spermatic fluid within it, although Fabricius asserts that this fluid is stored up there even for a whole year, and that all the eggs contained in the ovary may be thence fecundated, as it is afterwards stated." Harvey, however, fell into error in asserting that in "young chickens it was scarcely to be seen;" as we shall afterwards see, it is developed more in young than adult birds. This fact was first pointed out by Tannenberg in 1789, in his disquisition 'Circa genitalia partes muscularum avium' (Gottingæ), and has subsequently been recognized by most authors who have written on the subject (*vide* Cuvier², Milne-Edwards³, and Gegenbaur⁴). Barkow, in a paper "On the Cloaca of birds" in Meckel's 'Archiv'⁵, describes its condition in specimens he had examined of the Fowl, Duck,

¹ Hieronymi Fabricii ab Aquapendente opera anatomica. Patavii, 1625.

² Leçons d'Anatomie comparée, 2nd ed. vol. viii. p. 276.

³ Physiologie et Anatomie comparée, vol. viii. p. 514, and vol. vii. p. 347.

⁴ Vergleichende Anatomie, p. 799, note.

⁵ Archiv, 1829. p. 143 *et seq.*

Hooded Crow, Jackdaw, Bittern, Eared Owl (*Ohrkauze*), Honey-Buzzard, and Coot, showing that it is fully developed in young birds, but absent in old ones. He figures the bursa, together with the arteries supplying it (derived from the left pudendal), in both sexes of *Gallus domesticus* and *Fulica atra* (*op. cit.* tab. ix. fig. 13, 15, 19, 22-24, and t. x. f. 26). Berthold devotes a special memoir to it¹, in which he describes its nervous and vascular supply. Emil Huschke² describes its development, showing that it arises in the superior part of the cloaca, in which it is differentiated in the embryo of the Fowl from the 8th to the 9th day of incubation, acquiring by degrees a more perfect form, but that after a time it increases but slowly in comparison with the other parts of the embryo. M. Martin St.-Ange, in his fine paper "Etudes sur l'appareil reproducteur dans les cinq classes des vertébrés"³, figures and describes the bursa in the Common Pigeon. In one adult two-year-old Pigeon he found the interior of the bursa filled up with a sort of calculus, forming a complete cast of its interior. In all others of both sexes, it was reduced to about half its size, and the cavity entirely obliterated. He found that in the egg it was better-developed in proportion than other organs, but that after the age of about six months in Pigeons, and eight in Fowls, it began to lose its functional activity, and to become reduced in size. Lastly, in a paper published in the 'Atti della Società Italiana di Scienze Naturali,' 1875, vol. xviii. pp. 133-169 (for calling my attention to which I am indebted to Mr. Salvin), Signor Vincenzo Alesi, of Naples, has published an exhaustive essay on the structure and development of this organ, accompanied by two plates of histological details. His observations have been made on specimens of *Meleagris mexicana*, *Anser cinereus*, *Anas boschas*, *Columba livia*, *Turtur auritus*, *Corvus monedula*, *Turdus merula*, and *Coturnix communis*; and he has also examined the cloaca of a female *Rhea americana*, preserved in the Naples Museum. To his observations on the histological structure and process of atrophy of the bursa I will return after having briefly described the ordinary form and relations of this organ in the birds I have examined. These are 90 in number; and of many of them I have examined more than one specimen.

PASSERES.

Oriolus galbula.
Garrulax chinensis.
Citta thalassina.
Fregilus graculus.
Amblyramphus holosericeus.
Cissopis leveriana.

COCCYGOMORPHÆ.

Podargus cuvieri.

Dacelo gigantea.
Colius castanonotus.
Momotus lessonii.
Merops, sp.
Megalæma, sp.
Rhamphastos ariel.
Pteroglossus wiedi.
Trogon puella.
Cuculus canorus.
Cacomantis, sp.

¹ Aead. Cræs.-Leop. Nova Acta, 1828, xiv. pp. 903-918.

² De Bursæ Fabricii origine. Jenæ, 1838.

³ Mém. prés Ac. Sc. Franc. par savants divers, 1856, pp. 1-232.

Chrysococcyx, sp.
Geococcyx affinis.
Gaira pirivigua.

PSITTACI.

Stringops habroptilus.
Psittacus erithacus.
Pionus violuceus.
Tanygnathus muelleri.
Pyrrhulopsis splendens.
Platycercus icterotis.

ACCIPITRES.

Gyparchus papa.
Buteo jackul.
Archibuteo lagopus.
Geranoaëtus aquila.
Spizuëtus coronatus.
Haliaëtus vocifer.
Strix flammea.

STEGANOPODES.

Sula bassana.
Plotus ankinga.
Phalacrocorax carbo.
P. brasiliensis.

HERODIONES.

Ciconia alba.
C. boyciana.
Abdimia sphenorhyncha.
Xenorhynchus australis.
Ibis falcinellus.
I. rubra.
Ardea cocoi.
Cancroma cochlearia.

PALAMEDEÆ.

Chauna derbiana.

ANSERES.

Cygnus olor.
Tadorna rutila.
Fulica rufigula.

COLUMBÆ.

Pterocles arenarius.
Phaps chalcoptera.
Goura coronata.

GALLINÆ.

Crax sclateri.
Tetrao urogallus.
Lagopus scoticus.
Ortyx virginianus.
Odontophorus guianensis.
Callipepla gambeli.
Arboricola torqueola.
Caccabis chukur.
C. melanocephala.
C. saxatilis.
Francolinus vulgaris.
F. bicalcaratus.
Euplocamus cristatus.
Argus giganteus.
Meleagris mexicana.

ALECTORIDES.

Otis tarda.
Grus carunculata.
Serpentarius reptilivorus.
Ocydromus australis.
Porphyrio alleni.
P. martinicus.
P. poliocephalus.
Hydrophasianus chirurgus.

GRALLÆ.

Ædicnemus crepitans.
Attagus, sp.

GAVIÆ.

Larus ridibundus.

PYGOPODES.

Uria troile.
Alca torda.

TINAMI.

Rhynchotus rufescens.
Crypturus tatupa.

STRUTHIONES.

Struthio camelus.
Rhea americana.
Dromæus novæ-hollandiæ.
Casuarium beccarii.
C. picticollis.
C. uniappendiculatus.
Apteryx mantelli.
A. oweni.

For an opportunity of examining a specimen of the last I am indebted to Prof. Newton's kindness.

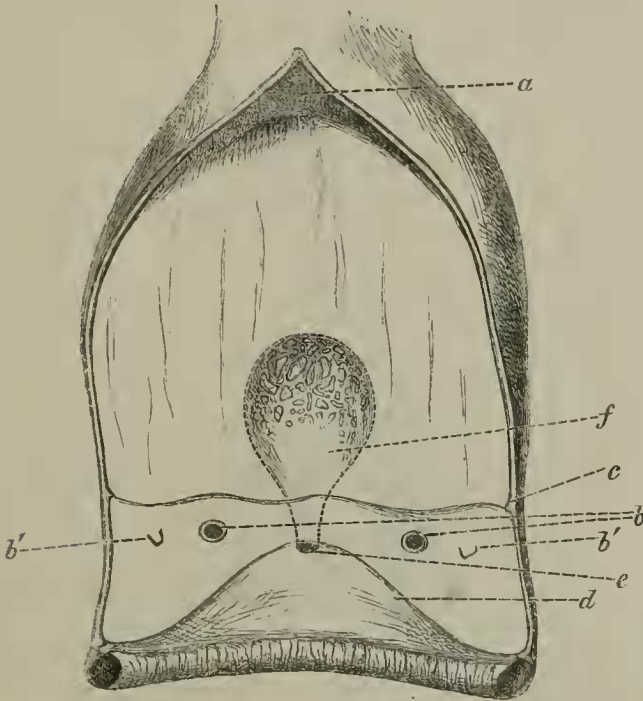
If the cloaca of an ordinary bird be taken and laid open in front (*i. e.* on the ventral surface) along the middle line, the rectum will be seen to terminate at the top of a more or less well-marked chamber, which usually is more capacious than the terminal part of the alimentary tract, from which it is generally separated off by a more or less plain valvular constriction, the different nature of the two parts being also frequently shown by the differences in the character of the mucous membrane lining them. Below the entrance of the rectum, on the posterior wall of the cloaca, and disposed symmetrically as regards the median line on the sides of which they lie, are the openings of the uro-genital ducts, frequently elevated on papillæ, which vary in shape in different birds. Of these the ureters open nearest the middle line; externally to them are the openings or opening of the vasa deferentia or oviduct, which latter is fully developed only on one side, though sometimes a trace of it may be seen on the other also. Above the uro-genital papillæ in many birds (*e. g.* *Meleagris mexicana* and *Tetrao urogallus*) is a well-marked valvular fold of mucous membrane, which thus separates off the upper portion of this "cloaca" from that part into which the urino-genital ducts open. Below these, again, is a similar, but usually better-marked fold (the vesical sphincter of St.-Ange), which is present in all the birds I have examined, in a more or less developed state. Below this in the middle line, and also on the posterior wall, is seen (if the specimen be not too old) a circular hole of varying dimensions. This is the opening of the "bursa Fabricii." This third part of the "cloaca" is bounded below by the external sphincter muscles, which often form in birds a great thick fleshy mass; this chamber, from lodging the penis or clitoris, is denominated "loge copulatrice" by M. St.-Ange. In many birds additional glands, opening by large pores, or forming irregular arborescent patches, are developed in the walls of the cloaca in this region. It results therefore from the above-described disposition of parts that, in its most developed form, a bird's "cloaca" is divided into three chambers communicating with each other, and into which open respectively (from above downwards), first the rectum, secondly the urino-genital ducts, thirdly the bursa Fabricii¹. This disposition of parts is seen in fig. 1 (p. 309). The bursa Fabricii, when well developed, consists of a sac-like pouch, usually with thick glandular walls: it is blind above and constricted below, and opens by a simple rounded orifice without any valve²

¹ Prof. Huxley describes it ('Anatomy of Vertebrate Animals,' p. 308) as opening into the "anterior and dorsal region of the cloaca." If "anterior" mean here, as I suppose it does, "anterior" as regards the whole length of the digestive tract, this is an error; for, as I have above stated, the opening of the bursa is in the lowest chamber of the cloaca (*i. e.* that nearest the vent), and therefore into the most "posterior" one as regards the general direction of the alimentary canal.

² Barkow, *l. s. c.*, describes the lower part of the peduncle of the bursa as projecting into the cloaca in the common Fowl, and there forming a conical sort of flap (*Zipfel*) over the opening. I have never myself seen any thing like this "Zipfel" in any bird I have examined; and all other writers are equally silent on the point. Most, indeed, say expressly that there is no valve or flap of any kind.

into the cloaca at the point already indicated. The bursa lies on the posterior wall of the cloaca (to which it is usually attached by a kind of aponeurosis) in the space between the cloaca and the pelvis. This

Fig. 1.



Cloaca of *Chauna derbiana*, laid open from before.

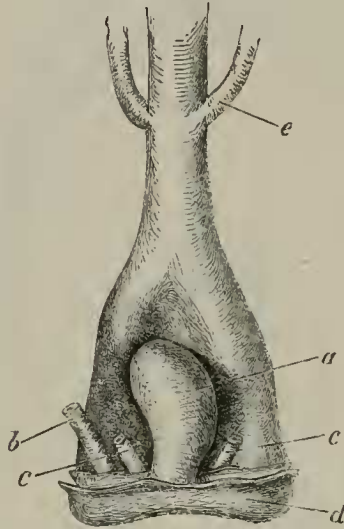
a. Rectum. *b.* Opening of ureters. *b'.* Genital papillæ. *c.* Fold of mucous membrane. *d.* "Vesical sphincter" of M. St.-Ange. *e.* Opening of bursa Fabricii. *f.* Bursa Fabricii (supposed to be seen through the posterior wall of the cloaca).

disposition of parts, as seen from behind, is shown in fig. 2 (p. 310), in the common Guillemot. The bursa when laid open frequently contains fæcal matter, more or less hard, or may be empty. The walls may be thin, as in the *Passeres*, Parrots, &c., or thick and markedly glandular, as in the *Gallinæ*, *Herodiones*, &c. The bursa is usually constricted below into a narrow peduncle, with a narrow central channel; above, the contained cavity is more considerable but of varying dimensions.

Signor Alesi, in the paper already referred to, has described at great length the minute structure of the bursa Fabricii in the common Fowl and some other birds. I must here content myself with giving a brief résumé of his conclusions as regards the histological structure of the organ in question. A transverse section of the wall in the neighbourhood of one of the ridges into which, in the Fowl and allied forms, the interior of the bursa is raised shows

the following constituent parts :—(1) an external layer of connective tissue, covering (2) a thick layer of elastic membrane; inside this is (3) a thin layer of mucous membrane, which unites together and connects the “lymphatic follicles.” These “lymphatic follicles” consist of masses of minute rounded cells, on an average 0·04 millim.

Fig. 2.

Back view of Cloaca of *Uria troile*.

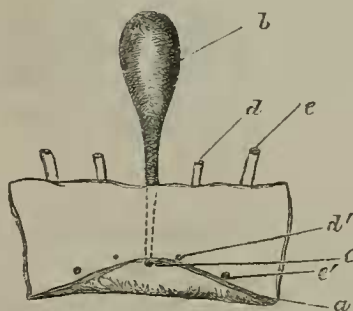
a. Bursa Fabricii. *b.* Oviduct. *c, c.* Ureters. *d.* Sphincter muscles. *e.* Cæca.

in diam., enclosed in capsules of connective tissue, in which ramify their nutrient vessels &c. The lymphatic follicles are bound together by processes of the connective mucous membrane into raised processes, which project on the interior of the bursa, forming ridge-like “crests,” and are covered with epithelium internally, the cells of the latter being lanceolate with oval nuclei. In *Rhea*, however, the follicles are not closely bound together in masses forming ridges, but are attached by peduncles of elastic tissue to a central stem, the whole having somewhat the appearance of a bunch of grapes with a few berries on it. As we have already seen, Tannenberg in 1789 was the first to point out that the bursa was more developed in young than old birds, it being gradually reduced and obliterated in the latter. This process of atrophy seems to obtain in all birds, so far as I can make out, though the periods of final disappearance seem to vary much in different groups. M. Martin St.-Ange found that the bursa began to lose its functional activity in Pigeons after six months, and in Fowls after eight; as a rule it seems to atrophy at about the period of full growth. On the other hand, in some cases it persists for long periods, and probably throughout life; for I found it well developed and quite open in a specimen of *Platycercus icterotis* that

had lived in the Society's Gardens for eleven years. As a rule, the central cavity of the bursa becomes diminished and the communication with the cloaca obliterated in the process of atrophy; and finally, in some cases at least, the whole organ completely disappears, losing its characteristic form and structure, and becoming fused with the tract of abdominal aponeurosis that covers the back wall of the alimentary canal, ultimately forming a flat riband-like, or round cord-like, ligamentous structure. Spangenberg observed the conversion of the bursa Fabricii into a round cord-like ligament in the Duck; and Alesi has observed it (and described it minutely, with figures showing the histological changes that go on) in the Fowl. He sums up the process of atrophy in the last-named bird as follows:—The epithelium which covers the internal surface of the bursa becomes, as it were, invaginated into the thickness of the mucous layer, becoming pressed in between the lymphatic follicles. The connective tissue between the latter increases rapidly in bulk, and becomes full of numerous small oval corpuscles; at the same time the follicles become absorbed, and the whole of the bursa becomes obliterated and fused with part of the abdominal aponeurosis. The epithelium gradually becomes confined to certain irregular tracts in the thickness of the mass of connective tissue; but even these disappear finally. The process of atrophy in the other species which he observed is essentially the same as that in the Fowl.

I now proceed to describe the general characters of the bursa Fabricii in the groups of birds I have examined. In the *Passeres* it is usually small, pyriform, with a small opening and glandular walls without ridge-like elevations on the interior. It seems to disappear completely in adult birds. In the *Rhamphastidæ*: dis-

Fig. 3.

Cloaca and Bursa of *Geococcyx affinis*.

The cloaca is cut short and laid open from before. The narrow peduncle of the bursa is supposed to be seen through the cloaca. *a*. "Vesical sphincter." *b*. Bursa. *c*. Opening of same. *d, d'*. Ureter and opening. *e, e'*. Vas deferens and opening.

appears in the adult, only leaving a small pore to mark its place of opening. In the *Cuculidæ* it presents a very characteristic shape, the peduncle being long and thin, and the extremity club-shaped,

giving the whole somewhat the appearance of a shortened and clumsy antenna of a butterfly (see fig. 3, p. 311) It disappears completely in adult birds. In specimens of *Dacelo gigantea*, *Merops*, and *Momotus lessoni* it was sac-like and of considerable size. In the Parrots it is well marked and bag-like, opening by a small pore. As already mentioned, in an old specimen of *Platycercus icterotis* I found the bursa well marked, though its opening into the cloaca was nearly obliterated. In a specimen of *Stringops* I found *no bursa*. In the *Accipitres* it forms a moderate-sized pyriform sac; in old birds this becomes reduced to a sort of small conical pouch in the substance of the back wall of the cloaca at the place of aperture. Of the *Steganopodes*, in *Phalacrocorax* (2 species) and *Sula bassana* the bursa is a large sac, $1\frac{1}{2}$ –2 inches in length, which opens by a small pore in the usual places. The walls of the bursa are very thick; they are traversed by about seven rows of large, irregular, crypt-like pores, separated by smooth, narrowed, raised ridges. The ridges and pores disappear towards the base of the bursa; but the upper part has a curious honeycomb-like appearance, somewhat like that of the Ruminant *reticulum*. The internal surface is covered with numerous, small, opaque, granular-looking corpuscles, especially towards the apex. In a young specimen of *Plotus ankinga* (♀) that I dissected, the appearance and disposition of the parts agreed very well with Prof. Garrod's description. I noticed, however, that the opening of the bursa was very *slightly constricted* by a slight fold of mucous membrane on each side, so that the bursa hardly opened by its entire width into the cloacal chamber. In other respects it showed a strong approximation to the disposition of these parts that I shall presently describe in the Ostrich and its allies.

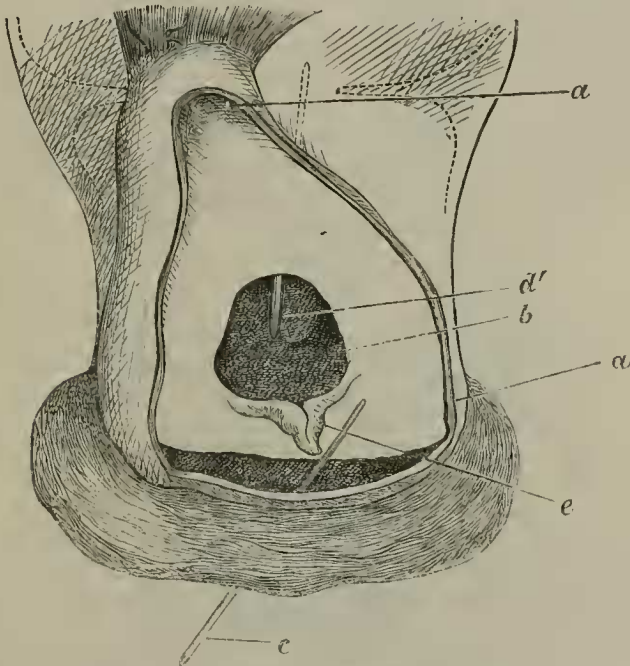
In the *Herodiones* the bursa is large and sac-like, with a small or moderate opening; its interior surface has no ridges or sulci, but large crypt-like pores collected in patches. In aged birds it seems to disappear, though in a specimen of *Abdimia* that had lived in the Gardens more than three years it was still present, $\frac{1}{2}$ inch long, with the opening still unobliterated.

In *Chauna* the bursa is a glandular pyriform sac, about 1 inch in length, with a moderate-sized opening (see fig. 1, p. 309). It seems to disappear entirely in old birds. In a specimen of *Cygnus olor* it was a large conical sac, $1\frac{1}{2}$ inch long, with a wide mouth, but slightly constricted off, and with no large glands. In aged specimens of *Fuligula rufina*, which had lived sixteen years in the Gardens, and of *Tadorna rutila*, which was nearly eighteen years old, the bursa had disappeared, in the former having assumed the appearance of a round cord-like ligament, in the latter having become fused with the abdominal aponeurosis. In each case a small pore marked the place of aperture.

In *Pterocles*, *Goura* (in a nine-months-old bird), and *Phaps* I have never found any thing more than a small blind pore in the usual place of the opening; as we know from M. St.-Auge, the bursa disappears very early in *Columba livia* as well.

In the *Gallinae* the bursa has a tubular or pyriform shape, with numerous well-marked alternating ridges and furrows, the latter highly glandular, on its internal surface. These ridges are most marked towards the superior (blind) end, and are formed by the projection into the interior of collections of lymphatic follicles. These last do *not* open by distinct pores into the cavity of the bursa, but are entirely closed, as shown by Signor Alesi and Leydig. In the process of atrophy the peduncle becomes solid; also the cavity of the bursa becomes shut off from the cloaca, and persists in this state for some time. Finally, however, the bursa seems to become reduced to a ligament-like structure, or to become fused with the general aponeurosis. In the Turkey the bursa is a long tubular sac, 2 inches long, with very well marked ridges and sulci. In all a pore marks the opening of the atrophied bursa. In *Serpentarius* the bursa is

Fig. 4.

Cloaca of *Casuarius uniappendiculatus*, viewed from behind.

a, a. Cut surface of posterior wall of bursa. *b.* Opening of cloacal chamber into bursa. *c.* Pointer passing from cavity of bursa to exterior. *d'.* Pointer passed from cloaca into bursa through opening *b*; the upper part is supposed to be seen through the wall of cloaca. *e.* Clitoris.

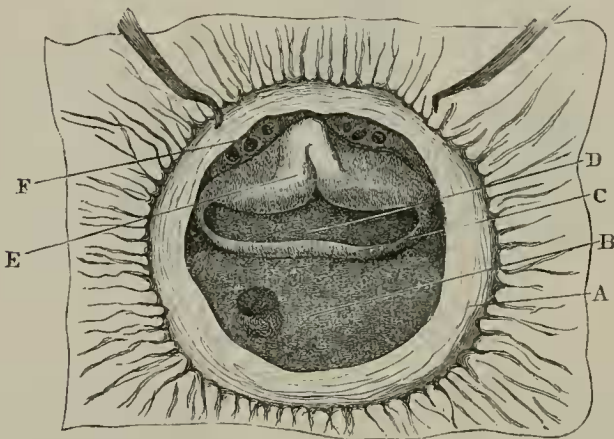
a large globular sac, with the glandular area confined to the apical region and a small aperture into the cloaca. In these respects it resembles *Otis* and *Grus*. In *Porphyrio* and *Ocydromus* it assumes the form of a long, narrow, cylindrical tube, the central cavity of which becomes closed up as atrophy advances. In *Ædicnemus* there is a similar form of bursa. In *Attagus*, on the other hand, the form is pyriform, more like that of the *Passeres* and *Gallinae*.

In *Larus* I found the bursa represented by a small pouch. In the young *Uria troile* it is large and sac-like, and slightly curved from side to side (see fig. 2, p. 310). The walls are very glandular, and so thick that the central cavity is but small. There are no crests. In an adult *Alca torda* it was reduced to a pore-like opening.

In none of the *Tinami* that I have dissected have I found any bursa; on the other hand, the posterior wall of the third cloacal chamber is covered with numerous glands arranged in a tree-like manner.

In all the birds hitherto mentioned (with the exception of *Plotus*) the bursa, as we have seen, opens by a more or less constricted aperture into the general cavity of the cloaca. In the Struthious birds, however, the very opposite is the case. The cloaca (or at least as much of it as corresponds to the first and second chambers) opens into the bursa Fabricii. This will perhaps be best explained by looking at fig. 4, p. 313, representing the cloaca and bursa of a not full-grown Cassowary (*Casuaris uniappendiculatus*) from behind. The bursa is, as one sees, a large, somewhat triangular sac, attached above by a broad riband-like muscle to the posterior wall of the alimentary canal. Most of the back wall of the bursa has been cut away (*a*), to show the opening into its cavity of the cloacal chamber (*b*), out of which a pointer (*d'*) is seen passing up into the rectum above through the recto-cloacal valve. From this, I think, it will at once be evident

Fig. 5.



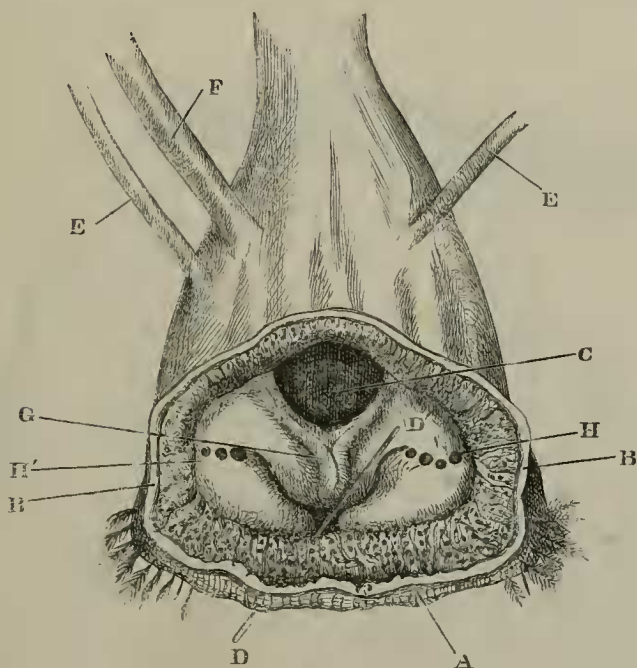
Vent of young Emu (*Dromæus novæ-hollandiæ*) with the parts still *in situ*, viewed from the outside.

A. External sphincter. B. Cavity of bursa. C. Wall of cloaca. D. Opening of cloaca into the bursa. E. Clitoris. F. Glandular pores.

that the cloaca does *not* open directly to the outer surface, but *indirectly through* the bursa by means of its large posterior and inferior aperture *b*. A similar condition of things is seen in fig. 5, in a young Emu (*Dromæus novæ-hollandiæ*)—where the parts are undisturbed

and *in situ*,—and in fig. 6, in an Ostrich (*Struthio comelus*, immature female)—where the bursa has been nearly all removed to show the posterior opening of the cloaca into its cavity, and the communication of the latter with the exterior, as indicated by the direction of the pointer (D D'). The same is the case in the young Nandou *Rhea americana*). In all these birds the walls of the bursa are thickly

Fig. 6.



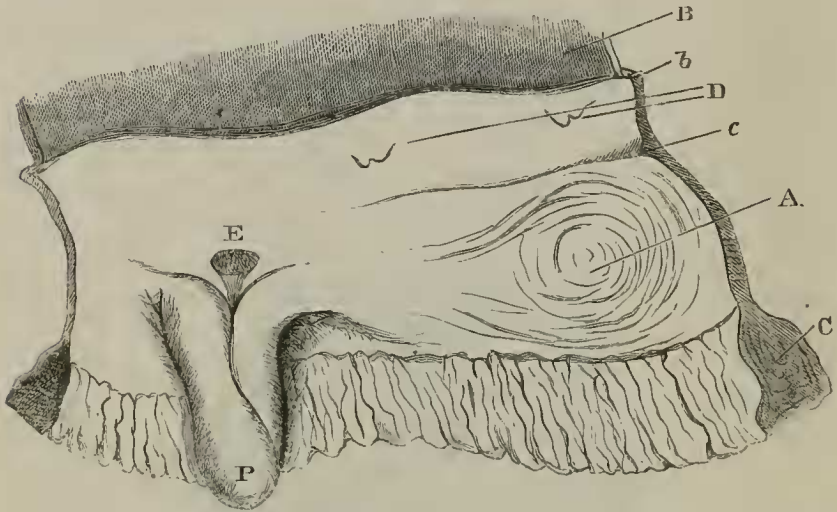
Cloaca and Bursa of young Ostrich (female), viewed from behind. Most of the posterior wall of the bursa has been removed.

A. External sphincter muscle. B. Cut surface of bursa. C. Opening of cloaca into bursa. D, D'. Pointer passing from bursa to exterior. E, E. Ureters. F. Oviduct. G. Clitoris. H, H'. Pores; beneath them the smooth, non-glandular part of the bursa.

glandular; there are no regular crests and sulci, however, but the glands are arranged in patches, the whole having a honeycomb-like or dendritic appearance. This disposition of parts, however, is not permanent. As the birds grow older, the size of the bursa gradually diminishes and its walls become less glandular; its mouth is no longer equal in extent to the whole width of the outermost chamber, but becomes narrowed; and finally the whole bursa disappears, its remains becoming lost in the muscles of the back of the cloaca. This state of atrophy of the bursa is represented in *Casuaris picticollis* in fig. 7 (p. 316), the only remains of its existence being seen in the few irregular circular folds on the mucous membrane at A.

At what age this change supervenes is not yet quite clear. The specimen of *C. beccarii* that died in the Society's Gardens last year, apparently an adult female, corresponded entirely in the disposition of these parts with the specimen of *C. uniappendiculatus* above described, which died shortly before, and was quite a young bird when received in 1874. On the other hand, in *C. picticollis* the bursa was entirely atrophied. This specimen, which also arrived in 1874, was then not quite adult; so that at the period of its death it must have been about three years old. Whether *Apteryx* agrees in these

Fig. 7.



Cloaca of *Casuarius picticollis*, adult male; viewed from before.

- A. Circular folds of mucous membrane, being the last remains of the Bursa.
 B. Rectum. *b.* Recto-cloacal valve. C. Cut surface of external sphincter muscle. *c.* Vesical sphincter. D. Urino-genital papilla. E. Glandular pore. P. Penis.

points also with the other *Struthiones* I am unable to say, as both the specimens I have dissected presented no trace of a bursa. Probably therefore in this, too, when adult the bursa disappears almost completely. I have mentioned above the singular differences shown by Signor Alesi to exist in the structure of the lymphatic follicles of the bursa of *Rhea* as compared with other birds.

Although at first sight the relation of these parts in *Rhea*, *Struthio*, &c. seems so different from that which obtains in other birds, yet a little reflection will, I think, convince one that it is not so in reality. I have represented diagrammatically (figs. 8 and 9, p. 317) what I conceive to be the true relations of the parts in question, denoting the homologous regions in the two forms (*Serpentarius* as illustrating the normal type, *Casuarius* the abnormal one) by similar letters. If we imagine B in fig. 8 to lose the constriction at its aperture into D, and D to become proportionately deeper, we should have a form corresponding to fig. 9, in which B passes uninterruptedly and without

constriction into D, the cavity B D thus formed receiving the aperture of C. In such a form as *Plotus*, where the opening is but very slightly constricted, we have a type connecting the two extremes; and I have seen *Rhea* in a stage very similar to that mentioned above in *Cygnus olor*. In confirmation of this view as to the true relation of these parts, in the Ostrich &c. the lower part of the bursa, in the region corresponding to D in figs. 8 and 9, is not glandular (*vide* fig. 6, p. 315, where the non-glandular part of the bursa is seen beneath pores H H').

Fig. 8.

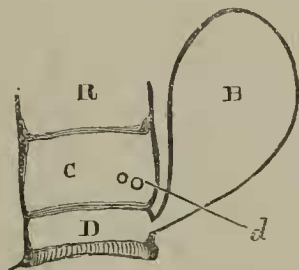


Fig. 9.

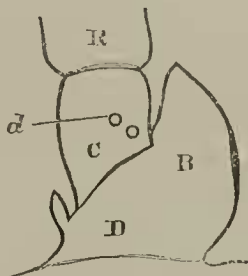


Diagram showing two chief Types of Development of the Bursa Fabricii.
R. Rectum. B. Bursa. C. Cloacal chamber. D. Lowest chamber of "cloaca."
d. Openings of urino-genital ducts.

With regard to the function and homologies of the bursa Fabricii, great differences have prevailed amongst authors. Thus Milne-Edwards says¹, "Fabricice d'Acquapendente, à qui l'on doit la découverte de cette bourse, la considérait comme un réservoir séminal, tandis que d'autres naturalistes² la regardent comme une vessie urinaire. Perrault et quelques auteurs modernes³ y voient l'analogue des glandes anales des Mammifères, et Geoffr. St.-Hilaire l'assimile aux glandes du Cowper⁴; enfin, M. Martin St.-Ange la compare à la prostate." Emil. Huschke, in the paper mentioned above, has studied its development, and, after a comparison of the organs of similar appearance, is inclined to consider it as the primitive urinary vesicle of the Wolfian bodies, from the fact that the ducts of this gland take origin from just that part of the cloaca which afterwards assumes the form of the bursa. Harvey and others have sufficiently disproved Fabricius's ideas as to its serving as a spermothea; nor can the bursa be regarded as a urinary bladder,—first, because it is not devoted to containing the urine; secondly, because in other *Sauropsida* and also in the *Mammalia* the urinary bladder is ventral, not dorsal, in position. For a similar reason, as well as from the fact that they are *paired* organs, the "*bursæ anales*" of the

¹ Phys. et Anat. Comp. vol. viii. p. 514.

² E. g. Berthold, Acad. Cas.-Leop. Nova Acta, xiv. p. 917, 1828, and Geoffroy St.-Hilaire, Mém. du Muséum, 1823, t. ix. p. 394.

³ E. g. Carus, 'Zootomia.'

⁴ Tiedemann, 'Anat. der Vögel,' 1810.

Testudinata can be in no way related to that under discussion. The anal glands of Mammals, again, open externally on the skin, and are in fact cutaneous glands. The prostate and glands of Cowper are purely male glands, and probably play some important function in the act of reproduction; so that they can hardly well correspond to an organ that is common to both sexes, and only proportionally developed in the young. It would be premature to accept Huschke's views without further observations on the subject. On the other hand, as pointed out by Signor Alesi, a lymphatic organ, constructed on a similar principle, but in a simpler form, exists in the patches of lymphatic follicles (which do not, however, in this instance project outside the mucous membrane of the intestine) in the appendix to the cæcum of the rabbit (described by Frey, 'Untersuchungen über die Lymphgefäße des Darmkanales,' Leipzig, 1863). An organ still more closely corresponding in its general shape and position with the bursa Fabricii is the sac-like pouch which opens into the dorsal wall of the cloaca in many Elasmobranchs¹. The glands of this, however, differ in structure from those of the bursa Fabricii; so that at present it seems to me that we can assign no very definite analogue or homologue for the latter, but that it is a glandular outgrowth of the cloaca peculiar to birds.

In conclusion, I may briefly capitulate the chief conclusions arrived at in this paper.

(1) That the bursa Fabricii exists in both sexes, and probably in all species, of birds.

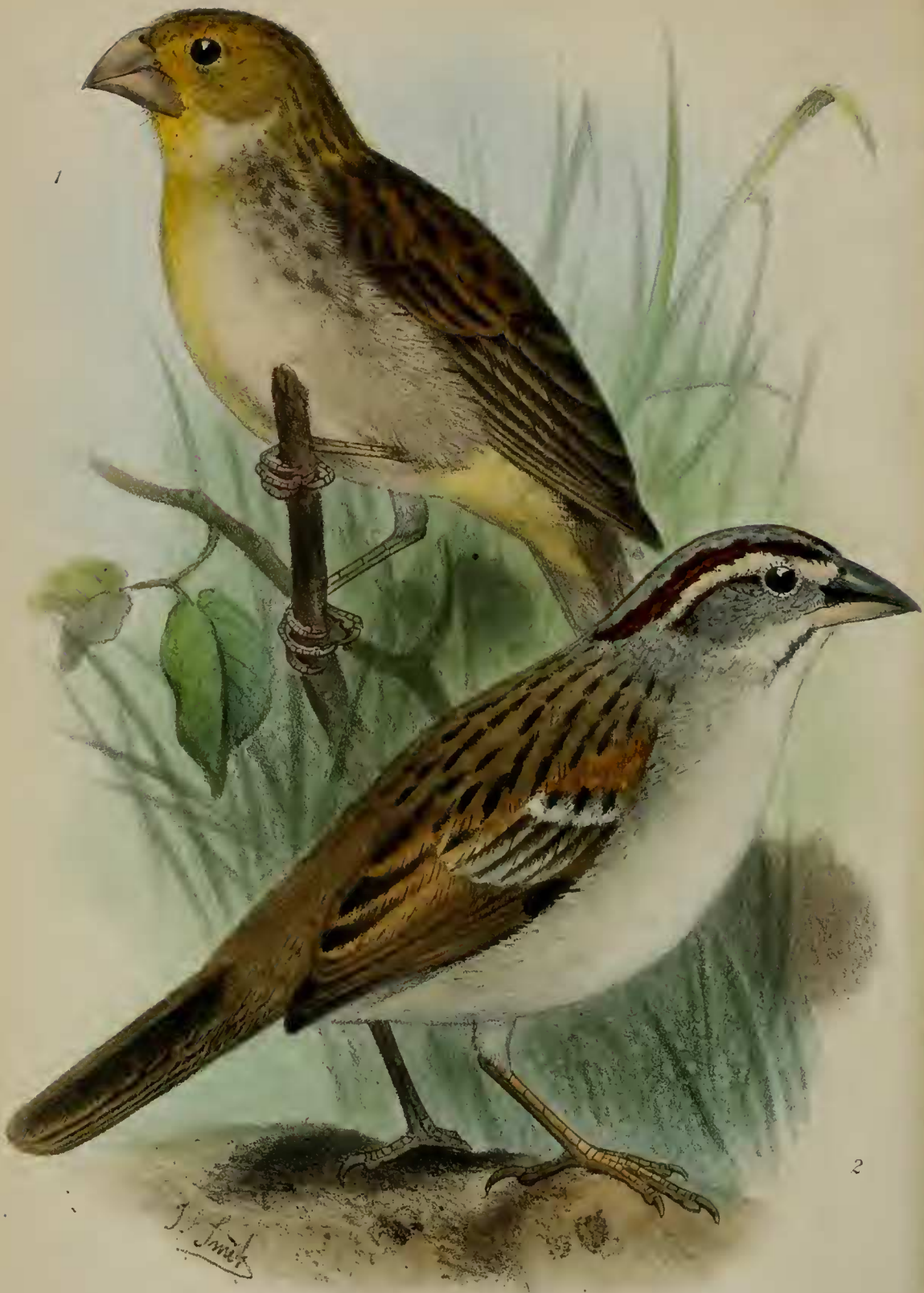
(2) That it is most developed in young birds, but becomes atrophied and more or less obliterated in adults, the period, however, of the commencement and conclusion of this process differing greatly in various birds. In some it probably persists, though in a state of functional inactivity, throughout life.

(3) That in the majority of birds the bursa is a moderate-sized or small sac, that opens by a narrow aperture on the dorsal wall of the cloaca into the lowest "chamber" of that organ.

(4) That in the Struthious birds, on the contrary (the state of *Apteryx* as regards these points being doubtful), the cloaca opens into the bursa by a posterior aperture, owing to the fact that the bursa is not constricted off at the neck, but is commensurate in extent with the third or outer chamber of the cloaca, the two being united into one. This condition, however, is only to be found in young birds.

(5) That the bursa is a glandular organ, of which lymphatic follicles are the essential constituents, but has no exact homologue in other classes of Vertebrata.

¹ Signor Alesi, in his paper, *s. c.*, alludes to this pouch as being *ventral* in position, which it certainly is not. It is figured in *Squatina vulgaris* by Gegenbaur (Vergl. Anatomie, fig. 267 *c.*, & p. 798). It is absent in *Chimæra*. Leydig has described its structure ('Beiträge z. microscop. Anat. u. Entwickel. der Rochen u. Haie,' Leipzig, 1852), and found that it consisted of collections of glands similar to the glands of Brunner.



J Smit lith.

Hanhart imp

1 GNATHOSPIZA RAIMONDII
 2 HAEMOPHILA STOLZMANNI

2. Liste des Oiseaux recueillis en 1876 au nord du Pérou occidental par MM. Jelski et Stolzmann. Par L. TACZANOWSKI, C.M.Z.S.

[Received March 17, 1877.]

(Plate XXXVI.)

Les espèces de cette liste ont été trouvées dans les localités suivantes :—

Tumbez, capitale de la province du même nom, faisant partie du Département Piura, située au bord du fleuve Tumbez, qui se verse dans la baie de Guaiacuil, et est éloignée de l'embouchure d' $1\frac{1}{2}$ legua (6 kilomètres).

Curaracha, port de Tumbez, situé dans la vallée du fleuve, composé de quelques cabanes et de la maison du capitaine du port.

Santa Luzia, petite colonie voisine de Curaracha, près de l'embouchure du fleuve. Cette localité ainsi que la précédente aboutit au manglar (bois de Rhizophores).

Lechugal, colonie composée d'une dizaine de cabanes, située sur la rivière Zurumilla, qui constitue la frontière entre Pérou et l'Equateur. Le caractère du pays est différent de celui des localités précédentes. L'abondance de l'*Usnea* qu'on y trouve a ce rapport avec l'ornithologie, que beaucoup d'oiseaux l'employent à la construction de leurs nids.

Poso de Lambedero, grand étang, long de 2 kilomètres, situé au milieu de forêt au voisinage de Lechugal. *Parra jacana*, *Ceryle cabanisii*, et *Fluvicola atripennis* proviennent de cet étang.

TROGLODYTIDÆ.

1. *CAMPYLORHYNCHUS BALTEATUS* (Baird).

Trois exemplaires de Tumbez. Iris blanc rose.

2. *THRYOTHORUS SUPERCILIARIS*, Lawr.

Une paire de Tumbez. Iris brun.

MNIOTILTIDÆ.

1. *PARULA PITIAYUMI* (Vieill.).

Un mâle de Tumbez. Iris brun foncé.

2. *GEOTHLYPIS POLIOCEPHALA*, Baird ?

Un mâle de Tumbez. Iris brun foncé.

3. *POLIOPTILA ALBILORA*, Scl. P. Z. S. 1860, p. 298.

Un exemplaire de Tumbez. Iris brun foncé.

VIREONIDÆ.

- CYCLORHIS VIRENTICEPS*, Scl. P. Z. S. 1860, p. 244, tab. clxiv.

Un exemplaire de Tumbez. Iris orangé.

HIRUNDINIDÆ.

PROGNE TAPERA (L.).

Un exemplaire tué entre Tumbez et Santa-Luzia. Iris brun foncé.

TANAGRIDÆ.

1. TANAGRA CYANOPTERA, Vieill.

Un mâle de Tumbez, une femelle de Lechugal.

2. SALTATOR OLIVASCENS, Cab.

Une paire tuée à Lechugal dans le mois de Mars. L'iris est indiqué bleu dans le mâle, et brun foncé dans la femelle.

3. EUPHONIA CRASSIROSTRIS, Scl. P. Z. S. 1856, p. 277.

Une femelle de Lechugal. Iris brun foncé.

FRINGILLIDÆ.

1. SPERMOPHILA TELASCO, Less.

Une femelle de Tumbez.

2. NEORHYNCHUS NASESUS (Bp.).

Un mâle adulte de Tumbez.

GNATHOSPIZA, n. g.

Rostrum Geospizæ, robustum, subcompressum, culmine modice arcuato, capitis verticem vix superante; lateribus mandibulæ inferioris subplanis; naribus basalibus, non tectis. Alæ mediocres, caudam dimidiam æquant, remige primo et secundo æqualibus, omnium longissimis; tertius vix brevior. Cauda brevis, æqualis. Tarsi mediocres, graciles; digitus posticus intermedio non robustior et brevior; digiti externi inter se æquales; ungues graciles. Color coturniculinus.

3. GNATHOSPIZA RAIMONDII, n. sp. (Plate XXXVI. fig. 1.)

Mas supra fulvo-griseus, fusco maculatus, capite flavido lavato; subtus isabellino-albidus, lateribus fulvo-griseis; loris, collo antico, regione oculari, pectore medio, flexura alarum subcaudalibusque citrino-flavis; alæ et cauda fuscæ, primariis flavido, secundariis albido tenuissime limbatis; tectricibus alarum tertiaribusque rufescenti-griseo late marginatis; rectricum dimidio basali flavo, terminali albido limbato; subalaribus albis. Rostrum pallide brunneum, pedes carnei, ungues pallidi, iris fusco-brunnea.

Fœm. mari similis, sed colore flavo pallidior et minus extenso.

	♂.	♀.
	mill.	mill.
Long. tota	123	120
„ alæ	69	65
„ caudæ	72	72
„ tarsi	19	18
„ rostri	13	13

Dans le mâle les parties supérieures sont d'un fauve grisâtre varié de taches brunes occupant le milieu de chaque plume, grosses et bien distinctes au dos, petites et moins apparentes au sommet de la tête, qui est en outre légèrement coloré d'une nuance verte jaunâtre ; les côtés du visage sont d'un jaune verdâtre plus intense et plus uniforme. Les lores, le tour des yeux, le menton, une moustache bordant la naissance de la mandibule inférieure, le devant de la gorge, et le bord des ailes sont jaunes ; les côtés du cou gris avec une grande tache blanchâtre bien prononcée. Le milieu de la poitrine et le ventre sont blancs d'une légère teinte isabelle et colorés çà et là de jaune ; les flancs gris, striés insensiblement d'une nuance plus foncée ; les subcaudales sont blanchâtres avec le centre de chaque plume plus ou moins coloré de jaune. Les ailes et la queue brunes ; sur les remiges primaires une fine bordure jaunâtre, et blanchâtre sur les secondaires ; les tertiaires et les couvertures supralaires bordées largement de fauve roussâtre ; les bordures des rectrices jaunes dans la moitié basale, et blanchâtres dans la terminale ; les subalaires blanches. Le bec est brunâtre clair, à mandibule inférieure plus pâle ; les pattes de couleur chair pâle, ainsi que les ongles ; iris brun foncé.

La femelle ressemble au mâle ; mais elle a le jaune du visage beaucoup plus pâle, et occupant seulement les lores, le menton, les moustaches, le tour des yeux et une bande sourcilière bien distincte ; les subcaudales sont aussi légèrement colorées de jaune ; le bord de l'aile est blanchâtre. Elle n'a point de nuance verdâtre sur le dessus et les côtés de la tête. Les ailes et la queue sont comme dans le mâle. Sur les côtés de la gorge elle a deux raies longitudinales grises bien distinctes, et qui dans le mâle sont en grande partie effacées par la couleur jaune.

Un mâle, probablement jeune, ressemble en tout à la femelle et n'en diffère que par le jaune du visage un peu plus intense, les subcaudales un peu plus colorées de jaune, ainsi que le bord de l'aile ; il a aussi un peu de jaune au bas de la gorge.

Trois mâles et une femelle des environs de Tumbez, tués à la fin de mai et dans la moitié de juin. Tous ces exemplaires sont en plumage tout frais, il est donc à espérer qu'à l'époque de la nœce la coloration est beaucoup plus prononcée dans certains détails. Cet oiseau s'y trouve en grand nombre, et M. Jelski dit que les bandes dans lesquelles il se tient ordinairement sont les plus nombreuses qu'il rencontrait pendant toute sa carrière d'ornithologiste.

Je suis heureux de pouvoir dédier cet intéressant oiseau à M. Raimondi, savant directeur du Musée de Lima, et qui ne cesse pas de travailler avec beaucoup de succès à l'exploration scientifique du Pérou.

4. CAMARHYNCHUS CINEREUS, Bp.

Guiraca cinerea, Lafr. Mag. Zool. 1843, pl. 20.

Camarhynchus cinereus, Salvin, Trans. Zool. Soc. ix. p. 491.

Trois mâles de Tumbez, tués à la fin de février et au commencement de mars. Iris brun clair.

5. *HÆMOPHILA STOLZMANNI*, n. sp. (Plate XXXVI. fig. 2.)

Supra cinereo-grisea fusco maculata; subtus albida, pectore hypochondriisque griseo indutis; capite binis vittis latis brunneo-ferrugineis, striga postoculari brunnea, mystacibus fuscis, loris superciliisque albidis notato; alæ et cauda fusco-brunneæ, remigibus tectricibusque majoribus fusco limbatis, tectricibus minoribus castaneis, flexura alarum flava. Rostri fusco-brunnei mandibula inferior flavida; pedes sordide carnei; iris rubro-brunnea. Long. tota 143 mill., alæ 68, caudæ 57, tarsi 20, rostri a commissura 16.

Le sommet de la tête est occupé par trois larges bandes longitudinales, dont celle du milieu est cendrée striée de brun, et bordée de chaque côté d'une bande également large brune ferrugineuse; ces deux dernières passent en noir au front et se rapprochent entre elles de sorte à atténuer la médiane grise en une raie linéaire blanche; les lores et les sourcils blancs, ces derniers teints d'une nuance cendrée dans leur partie postérieure; un trait brun ferrugineux se trouve en arrière de chaque œil; les joues et les côtés du cou sont d'un gris cendré; la gorge blanche bordée des deux côtés d'une fine moustache foncée, commençant à la naissance de la mandibule inférieure; entre cette moustache et la couleur grise des joues se trouve une large raie blanche. Le dos est gris strié de brun foncé; le croupion gris unicolore. Tout le dessous est blanchâtre teint de grisâtre sur la poitrine et les côtés du ventre. Les ailes et la queue sont bruns à remiges bordées de fauve; les petites couvertures terminées largement de roux cannelé de manière à former une couleur uniforme sur le devant de l'aile; les grandes couvertures bordées de fauve blanchâtre; le bord de l'aile est d'un jaune pâle; les subalaires blanches; les fines bordures des rectrices grises, et celles des externes blanchâtres.

Deux mâles de Tumbes, tués le 26 mars.

6. *CORYPHOSPINGUS CRUENTUS* (Less.).

Deux mâles et une femelle de Lechugal, tués dans la moitié de mars. Iris brun foncé.

7. *POOSPIZA BONAPARTII*, Scl.

Un mâle de Tumbes, tué le 23 juin. Iris brun foncé.

8. *SYCALIS FLAVEOLA* (L.).

Trois paires de Tumbes, où l'oiseau est très-commun. Iris brun foncé.

ICTERIDÆ.

1. *CASSICUS FLAVICRISSUS*, Scl. et Salv. P. Z. S. 1860, p. 276.

Deux mâles et une femelle de Lechugal, tués dans le mois de mars; connu dans la contrée sous le nom Coulemba. Iris bleu clair.

2. *CASSICUS PREVOSTI*, Less.

Un mâle de Tumbes, tué le 23 juin. Iris blanc jaunâtre.

3. TRUPIALIS LOYCA (Molina).

Un mâle de Tumbes, tué le 2 mars. Iris brun foncé.

4. MOLOTHRUS, sp. ?

Deux exemplaires de Tumbes sans indication de sexe, probablement des femelles.

5. ICTERUS MESOMELAS, Wagl.

Un mâle de Tumbes.

6. ICTERUS GRACE-ANNÆ, Cassin, Proc. Acad. Philad. 1867, p. 52.

Une paire de Tumbes. Iris brun foncé.

7. APHOBUS CHOPI (Vieill.).

Un exemplaire de Tumbes. Iris brun foncé.

8. CASSIDIX ATER (Vieill.).

Un mâle de Lechugal.

9. QUISCALUS ASSIMILIS, Scl.

Une femelle de Santa-Luzia, tuée le 13 janvier. Iris brun foncé.

CORVIDÆ.

CYANOCORAX MYSTACALIS (Geoff.).

Un mâle de Tumbes, tué le 26 janvier. Iris jaune clair.

DENDROCOLAPTIDÆ.

1. FURNARIUS CINNAMOMEUS, Lafr.

Trois exemplaires de Tumbes, tués le 13 janvier et le 17 juin. Iris blanc jaunâtre.

2. XIPHORHYNCHUS THORACICUS, Scl.

Une femelle de Lechugal. Iris brun foncé.

3. PICOLAPTES SOULEYETI (Des Murs).

Un exemplaire de Tumbes, tué le 28 janvier. Iris brun foncé.

4. SITTASOMUS OLIVACEUS (Wied).

Un mâle adulte de Lechugal, tué le 17 mars.

5. SYNALLAXIS STICTOTHORAX, Scl.

Un exemplaire de Tumbes.

6. SYNALLAXIS TITHYS, n. sp.

Supra fusco-grisea, subtus cinerea; capite gulaque schistaceis, abdomine medio albido; alæ et cauda fuscæ, tectricibus alarum vivide cinnamomeis, subalaribus albis. Rostrum nigricans, pedes cornei, iris castanea. Long. tota 138 mill., alæ 57, caudæ 62, rostri a commissura 17, tarsi 18.

La femelle unique fournie par M. Stolzmann de Lechugal est d'une

couleur grise brunâtre au dos, à tête ardoise beaucoup plus foncée ; la gorge ardoise avec un lustre soyeux et finement striée de blanchâtre au menton ; le dessous du corps gris cendré et blanchâtre au milieu du ventre. Les ailes et la queue brunes foncées ; les couvertures alaires d'un roux cannelle clair et uniforme sur tout le devant de l'aile ; remiges secondaires largement bordées de roussâtre ; sub-alaires blanches avec une légère nuance isabelle.

La queue de cet exemplaire est incomplète, mais distinctement fort étagée et à 10 rectrices ; la différence entre les rectrices latérales et les médianes est de 38 mill.

FORMICARIIDÆ.

1. THAMNOPHILUS ALBINUCHALIS, ScL. P. Z. S. 1855, p. 18.

Deux mâles et une femelle de Tumbes, tués en janvier et en juin. Iris du mâle brun grisâtre foncé, celui de la femelle brun foncé.

2. THAMNOPHILUS TRANSANDEANUS, ScL.

Une femelle prise à Tumbes dans un piège à souris, le 28 juin. Iris orangé.

TYRANNIDÆ.

1. OCHTHÆCA SALVINI, n. sp.

Supra fusco-grisea, subtus lutea ; pileo, loris, genisque nigro-schistaceis ; fronte superciliisque latis luteis ; alis caudaque nigricantibus ; fascia lata alari alba ; remigibus albo limbatis et terminatis ; pogonio externo rectricum primi et secundi parvis albo. Rostrum nigrum ; pedes plumbeo-nigricantes ; iris fusco-brunnea. Long. tota 125 mill., alæ 68, caudæ 60, rostri a commissura 15, tarsi 18.

Dessus de la tête, les lores et les côtés du visage sont d'un noir ardoise foncé ; une teinte moins foncée et prenant un ton olivâtre couvre toutes les parties supérieures du corps ; le front et une bande sourcilnière très-large s'étendant jusque sur le derrière de la tête sont d'une couleur jaune de serin, ainsi que tout le dessous du corps, excepté les côtés du ventre, qui sont grisâtres, le bas ventre, les sub-alaires et les subcaudales, qui sont d'un jaune blanchâtre. Les ailes et la queue sont noirâtres ; une large bande blanche légèrement lavée de jaunâtre traverse l'aile en occupant les extrémités des grandes couvertures ; toutes les remiges ont des bordures blanches, très-fines sur les primaires, et plus larges sur les secondaires ; les extrémités mêmes des plumes sont aussi entourées de la même couleur ; le bord interne des remiges est blanc nuancé légèrement de jaunâtre ; la barbe externe des rectrices latérales blanche en entier, sur celles de la seconde paire le blanc s'arrête à une petite distance du bout de la plume, sur les suivantes cet effet s'arrête de plus en plus près de la naissance et est teinté de jaunâtre ; les médianes toutes noires ; les extrémités mêmes des rectrices sont terminées d'une fine bordure blanche.

Cet oiseau a à peu près la taille de *O. lessoni*, il a le bec un peu plus fort et plus long que dans l'espèce citée.

Trois mâles des environs de Tumbes, tués en janvier et en juillet.

2. FLUVICOLA ATRIPENNIS, Scl. P. Z. S. 1860, p. 280.

Un exemplaire tué sur l'étang Pozo de Lambedero le 25 mars.
Iris brun foncé.

3. MUSCIGRALLA BREVICAUDA, Lafr. et Orb.

Un exemplaire de Tumbez. Iris terre-de-Sienne.

4. TODIROSTRUM CINEREUM (L.).

Un exemplaire de Tumbez.

5. EUSCARTHMUS FULVICEPS, Scl. P. Z. S. 1871, p. 497.

Un exemplaire de Tumbez. Iris brun foncé.

6. PHYLLOMYIAS TUMBEZANA, n. sp.

Supra fusco-grisea, subtus albida, ventre toto flavicante pallidissime perfuso, pectore lateribusque griseo tinctis, loris superciliiisque cinereo-albidis; alæ et cauda dorso concolores, remigibus rectricibusque albido limbatis; tectricibus alarum binis fasciis latis pallidis ornatis; pogonio externo rectricis lateralis pallido. Rostrum nigrum, pedes nigricantes, iris fusco-brunnea. Long. tota 120 mill., alæ 60, caudæ 56, rostri a commissura 14, tarsi 20.

Cet oiseau ressemble beaucoup au *P. semifusea*, Scl., mais il est d'une taille un peu plus forte, et s'en distingue par la couleur des parties supérieures du corps grise brunâtre foncée sans aucune trace de nuance olivâtre; la couleur de l'abdomen, des subcaudales, et des tectrices subalaires blanchâtre induite de jaunâtre à peine distinct. Les lores et la bande sourcilière d'un cendré clair; les remiges et les rectrices bordées finement de blanchâtre, avec une nuance jaunâtre très-faible; la barbe externe des rectrices latérales est blanchâtre sâle dans toute sa largeur; également comme dans l'espèce citée des larges bordures des grandes couvertures alaires constituent deux larges bandes d'un fauve roussâtre. Bec noir, pattes noirâtres, iris brun foncé.

3^e et 4^e remiges les plus longues et égales, 5^e égale à la 2^e, 1^{re} à la 8^{me}.

Deux individus de Tumbez, dont un mâle tué le 7 mars, et l'autre, sans indication de sexe, tué le 10 février.

7. EUPSILOSTOMA PUSILLUM, Scl.

Une exemplaire de Tumbez.

8. ELAINEA PLACENS, Scl.

Une paire de Lechugal.

9. ELAINEA LEUCOSPODIA, n. sp.

Supra grisea, pileo fusco, crista interna alba; loris annuloque oculari albo; gula alba, abdomine albido, hypochondriis griseis, subcaudalibus flavicantibus; alæ et cauda fusce, remigibus extus anguste albo limbatis, tectricibus griseo marginatis, rec-

trice laterali tota albida. Rostri nigricantis mandibula inferior pallida; pedes nigricantes; iris fusco-brunnea. Long. tota 113 mill., alæ 62, caudæ 51, rostri a commissura 13, tarsi 20.

Dos gris, légèrement olivâtre; sommet de la tête comme dans l'*E. modesta* et beaucoup d'autres, plus foncé, à huppe blanche intérieurement; les lores et le tour des yeux blancs; parties inférieures du corps blanchâtres, côtés du cou, de la poitrine et du ventre gris; le blanc de l'abdomen induit légèrement d'isabelle; les subcaudales et les subalaires colorées de jaune très-faible. Les ailes et la queue un peu plus foncées que le dos; les remiges et les rectrices finement bordées de blanchâtre; le bord interne des remiges blanc; les rectrices latérales blanchâtres en entier; tectrices alaires largement bordées de gris. Bec noirâtre à mandibule inférieure pâle; pattes noirâtres; iris brun foncé. Taille de l'*E. caniceps*.

Exemplaire unique sans indication de sexe de Tumbez, tué le 10 février.

10. *MYIOZETETES SIMILIS* (Spix).

Un exemplaire de Tumbez, tué le 23 juin. Iris d'un chocolat grisâtre.

11. *RHYNCHOCYCLUS SULPHURESCENS* (Spix).

Une paire de Lechugal.

12. *MYIODYNASTES AUDAX* (Gm.).

Un exemplaire de Lechugal, tué le 25 février. Iris brun foncé.

13. *MYIODYNASTES ATRIFRONS*, Scl. P. Z. S. 1859, p. 73.

Trois exemplaires de Tumbez, tués à la fin de janvier et au commencement de mars. Iris brun foncé.

14. *MYIOBIUS CRYPTERYTHRUS*, Scl. P. Z. S. 1860, p. 474.

Une paire de Tumbez, tuée à la fin de janvier. Iris brun foncé.

15. *PYROCEPHALUS RUBINEUS* (Bodd.).

Quatre exemplaires de Tumbez.

16. *MYIARCHUS PHEOCEPHALUS*, Scl. P. Z. S. 1860, p. 281.

Un exemplaire de Lechugal. Iris brun foncé.

17. *TYRANNUS MELANCHOLICUS*, Vieill.

Un oiseau tué entre Tumbez et Santa Luzia.

18. *TYRANNUS NIVEIGULARIS*, Scl.

Une paire de Tumbez, tuée le 10 janvier et le 28 février. Iris brun foncé.

COTINGIDÆ.

1. *HADROSTOMUS HOMOCHROUS*, Scl. P. Z. S. 1859, p. 142.

Quatre mâles en différents plumages et une femelle de Lechugal. Iris brun foncé.

2. CALLOPSARIS ALBOGRISEUS (Scl.), P. Z. S. 1857, p. 78.

Deux femelles de Lechugal. Iris brun foncé.

TROCHILIDÆ.

1. ACESTRURA MICRURA (Gould). Introd. Monogr. Troch. p. 920.

Un mâle de Tumbez.

2. AMAZILIA LEUCOPHÆA, Reichb.; Gould, Monogr. Troch. v. pl. ccevi.

Un mâle de Tumbez.

CAPRIMULGIDÆ.

1. CHORDEILES ACUTUS, Cass.

Un exemplaire de Tumbez.

2. NYCTIDROMUS ALBICOLLIS (Gm.).

Un jeune oiseau de Lechugal.

PICIDÆ.

1. CHLORONERPES CALLONOTUS (Waterh.).

Une paire (♂ et ♀) tuée dans les algarrobes des environs de Tumbez, le 10 janvier et le 1 mars. La couleur des yeux est indiquée dans le mâle, gris-brunâtre, et d'un gris-violet foncé dans la femelle.

Les côtés de la gorge, la poitrine, les côtés de l'abdomen et les subcaudales ont dans les deux individus des stries transversales foncées bien distinctes, ce qui n'est pas mentionné dans la description de Waterhouse, ni dans celle de Lafresnaye.

2. CHLORONERPES CANIPILEUS (Orb.).

Deux mâles de Tumbez et de Lechugal. Iris brun foncé.

3. PICUMNUS SCLATERI, n. sp.

♀. *Supra murinus, fusco albidoque obsolete transfusciatus, pileo nigro albo guttulato; subtus albidus, collo pectoreque nigricanti transfusciatis, abdomine longitudinaliter fusco maculato; ala fusca, remigibus pallide limbatis; cauda nigra, pogonio interno reetricum mediarum albo; subalaribus albis. Rostrum plumbeo-nigricans; pedes plumbei; iris fusco-brunnea. Long. tota 85 mill., ala 53, caudæ 31, rostri u commissura 17, tarsi 12.*

Ce picumne, dont une femelle m'a été fournie de Lechugal, ressemble beaucoup au *P. cirrhatus*, Temm., il a également le dos gris de souris, rayé transversalement d'une nuance un peu plus foncée et de blanchâtre; mais cette dernière est moins distincte que dans l'espèce citée. Le dessus de la tête est noir, maculé de gouttelettes blanches, beaucoup plus grandes que celles de l'espèce citée, et de toutes les autres; le croupion est également blanchâtre varié de foncé. Le fond de tout le dessous du corps est blanc, rayé transversalement de noirâtre sur la gorge et sur la poitrine, de sorte que

les raies foncées et les blanches sont à peu près également larges, tandis que les raies foncées de l'abdomen, aussi larges, sont disposées dans le sens de la longueur du corps ; il y a aussi au milieu du ventre des petites stries transversales, mais peu significantes. Les plumes couvrant les narines sont blanches pures, tandis qu'elles sont rousses dans le *P. cirrhatus*. Les ailes sont plus foncées que le dos à remiges primaires bordées finement d'une nuance plus claire ; les bordures des secondaires et surtout celles des tertiaires sont beaucoup plus larges et d'une couleur fauve blanchâtre ; les couvertures alaires sont entourées d'une bordure foncée très-subtile ; les subalaires, ainsi que les bords internes des remiges, blanches. La queue est noire à barbe interne des rectrices médianes blanche en entier.

Le bec de cet oiseau est moins fort que dans le *P. cirrhatus*, la base de la mandibule inférieure plombée, tandis que dans ce dernier elle est d'une nuance bien différente de son extrémité.

Il diffère aussi du *P. temminckii* Lafr. par la couleur du dos, qui n'a rien de verdâtre, et par la direction des raies abdominales, ainsi que par la couleur du bec, qui dans l'espèce citée est gris jaunâtre.

ALCEDINIDÆ.

1. *CERYLE CABANISI* (Tsch.).

Une femelle de Lechugal.

2. *CERYLE TORQUATA* (L.).

Un mâle de Lechugal.

MOMOTIDÆ.

MOMOTUS MICROSTEPHANUS (Cab.); Mus. Hein. ii. p. 114.

Une femelle de Lechugal. Iris brun foncé.

TROGONIDÆ.

1. *TROGON MELANURUS*, Sws.

Un mâle de Lechugal. Iris blanc.

2. *TROGON CALIGATUS*, Gould.

Une femelle de Lechugal. Iris brun foncé.

CUCULIDÆ.

1. *CROTOPHAGA SULCIROSTRIS*, Sws.

Un exemplaire de Tumbez.

2. *PIAYA NIGRICRISSA*, Scl. P. Z. S. 1860, p. 285.

Un exemplaire de Lechugal. Iris rouge cerise.

3. *COCCYZUS ERYTHROPHthalmus* (Wils.).

Un exemplaire du Lechugal. Iris gris brunâtre très-foncé.

PSITTACIDÆ.

1. *CONURUS ERYTHROGENYS* (Less.).

Un mâle de Tumbez.

2. *BROTOGERYS PYRRHOPTERA* (Lath.).

Un exemplaire de Lechugal. Iris brun foncé.

3. *PSITTACULA CŒLESTIS* (Less.).

Quatre exemplaires de Tumbez, où l'oiseau est très-commun. Iris brun.

FALCONIDÆ.

1. *URUBITINGA ANTHRACINA* (Nitzsch).

Un exemplaire adulte de Lechugal.

2. *URUBITINGA UNICINCTA* (Temm.).

Un jeune oiseau de Santa Luzia.

3. *HERPETOTHERES CACHINNANS*, Vieill.

Un exemplaire de Lechugal.

4. *GERANOSPIZA CÆRULESCENS* (Vieill.).

Deux mâles tués à Lechugal le 5 avril. Iris de l'oiseau adulte est brun avec une bordure jaune très-fine ; celui du plus jeune est brun rougeâtre.

5. *ACCIPITER BICOLOR* (Vieill.).

Une femelle de Tumbez tuée le 19 juin. Iris jaune clair ; la cire et le tour des paupières jaunes ; pattes jaunes orangées.

6. *ICTINIA PLUMBEA* (Vieill.).

Un jeune oiseau de Lechugal.

STRIGIDÆ.

GLAUCIDIUM PHALENOIDES (Daud.).

Un exemplaire de Tumbez.

ARDEIDÆ.

NYCTICORAX GARDENI (Gm.).

Un jeune exemplaire en plumage de transition de Lechugal. Iris rouge.

COLUMBIDÆ.

PERISTERA CINEREA (Temm.).

Un mâle de Lechugal. Iris composée d'un anneau extérieur large d'une couleur rose-violette, suivi d'un autre anneau gris très-étroit ; ensuite l'interne également subtil est fauve.

RALLIDÆ.

PARRA JACANA (L.).

Un mâle de l'étang Pozo de Lambecro.

CHARADRIIDÆ.

1. *ÆGIALITIS WILSONIANA* (Orb.).
Un exemplaire tué entre Tumbez et Santa Luzia.
2. *SQUATAROLA HELVETICA* (L.).
Un exemplaire de Chimbote.

SCOLOPACIDÆ.

1. *TOTANUS CHLOROPYGIUS*, Vieill.
Un exemplaire de Lechugal. Iris brun foncé.
2. *ACTITIS MACULARIA* (L.).
Un jeune oiseau de Tumbez.
3. *PHALAROPUS HYPERBOREUS*, L.
Un oiseau en plumage d'hiver tué à Tumbez le 28 janvier.
4. *TRINGA MINUTILLA* (Vieill.).
Un exemplaire tué entre Tumbez et Santa Luzia.
5. *NUMENIUS HUDSONICUS* (Lath.).
Plusieurs exemplaires de Chimbote et de Santa Luzia.

PHÆNICOPTERIDÆ.

PHÆNICOPTERUS IGNIPALLIATUS (Geoff. et Orb.).

Un exemplaire de la delte de Tumbez.

Sur les 92 espèces provenant de cette contrée il y a 72 qui n'ont pas été fournies par M. Jelski de toutes les localités du Pérou central qu'il a visité précédemment. Un certain nombre de ces espèces a été déjà trouvé dans le pays par d'autres voyageurs, il reste cependant un nombre assez considérables de formes à introduire pour la première fois dans la faune péruvienne.

En comparant cette liste avec celle du Pérou central de M. Jelski, on voit une grande différence dans la richesse de certaines familles. La famille de Tanagrides si abondante en espèces au Pérou central, n'est représentée dans ce dernier envoi que par 3 formes ; on peut dire le même des Colibris et des Formicariïdes. Au contraire le groupe des Ictérides y paraît être beaucoup plus abondant. M. Jelski, de toutes les localités du Pérou central qu'il a visité, n'a fourni que 6 espèces, tandis qu'on en a envoyé 9 de ce dernier territoire restreint, voisin de l'Equateur. Les groupes des Fringillides et des Tyrannides y paraissent être aussi nombreux comme dans le Pérou central. Toutes ces suppositions pourront être changées quand nos explorateurs auront visité les montagnes voisines.

À la liste précédente des oiseaux recueillis par M. Jelski au Pérou central, on peut ajouter les deux espèces suivantes :—

PORZANA ERYTHROPS, ScL. P. Z. S. 1867, p. 373. f. xxi.

Un mâle des environs de Lima.

Parmi les merles des localités précédentes il y a un mâle adulte de Ropaybamba, bien différent du *Turdus serranus*, Tschud., et qui me paraît être inédit ; je présente donc sa description :

TURDUS LEUCOPS, n. sp.

Nigerrimus unicolor, rostro pedibusque flavis, iride sordide alba, cauda mediocri æquali ; remige tertio longissimo, primæ tectricarum æquali.

Ce merle est beaucoup plus petit et très-différent du *T. serranus* Tsch. ; sa queue est beaucoup plus courte, coupée presque carrément à l'extrémité, de sorte que les rectrices externes sont seulement de deux mill. plus courtes que les autres, qui sont égales entre elles, tandis que dans le *T. serranus* la queue est beaucoup plus longue, à rectrices beaucoup plus larges et fort arrondie à l'extrémité, la rectrice externe est de 8 mill. plus courte que la suivante, et de 16 mill. moins longue que les médianes. La proportion des remiges externes est autre ; la 1^{re} est étroite et égale aux grandes couvertures, tandis qu'elle est beaucoup plus longue dans l'espèce citée ; la 3^e est la plus longue, la 4^e un peu plus courte, et un peu plus longue que la 5^e, la 2^e plus courte que la 6^e et beaucoup plus longue que la 7^e. Dans le *T. serranus* c'est la 4^e qui est la plus longue, et la 2^e presque égale à la 7^e.

Le bec est beaucoup plus court ; les pattes plus courtes et plus faibles. Le noir de la couleur générale est très-intense dans cette nouvelle espèce, avec un éclat bleuâtre bien distinct, presque uniforme sur toutes les parties du corps. Le bec est jaune de cire ; les pattes et les ongles d'un jaune plus pâle et plus uniforme que dans le *T. serranus* ; l'iris est d'un blanc sâle.

Dimensions comparatives des deux formes :—

	<i>T. leucops.</i>	<i>T. serranus.</i>
	millim.	millim.
Longueur de l'aile pliée	120	130
„ de la queue	85	114
„ du bec depuis la commissure	22	28
„ du bec depuis les narines	11	13
„ du tarse	27	34
„ du doigt médian sans ongle	22	24

Nos voyageurs ont aussi fait une excursion de quelques semaines dans une forêt vierge nommée Palmal, située sur le territoire de l'Equateur, dans le district de Santa Rosa, province de Guayaquil, éloignée seulement de 4 heures de Lechugal. M. Stolzmann a envoyé de cette forêt les espèces suivantes, et prétend que la faune ornithologique de cette localité est bien différente de celle des environs de Tumbez et de Lechugal.

BASILEUTERUS UROPYGIALIS, Scl.

Mâle adulte et un jeune.

RAMPHOCELUS ICTERONOTUS, Bp.

Une paire (♂, ♀) d'oiseaux adultes, tués à la fin d'avril et au commencement de mai. Iris du mâle brun rougeâtre, celui de la femelle brun grisâtre foncé.

TACHYPHONUS LUCTUOSUS, Lafr. et Orb.

Un mâle adulte.

ARREMON SPECTABILIS, Scl. P. Z. S. 1854, p. 114, t. lxvii.

Un mâle adulte, tué le 30 avril. Iris brun clair.

SALTATOR MAGNUS (Gm.).

Un exemplaire.

EMBERNAGRA CHRYSOMA, Scl. P. Z. S. 1860, p. 275.

Un exemplaire tué le 20 mai. Iris brun rougeâtre.

PYRANGA AZARÆ, Orb.

Une femelle.

SITTASOMUS OLIVACEUS (Wied).

Un jeune mâle.

DENDROCINCLA ATRIROSTRIS (Lafr.).

Un exemplaire tué le 3 avril. Iris gris.

THAMNOPHILUS CÆSIUS, Licht.

Un mâle adulte.

PYROCEPHALUS RUBINEUS (Bodd.).

Un mâle adulte, aussi petit comme ceux des environs de Tumbes.

PLATYRHYNCHUS ALBIGULARIS, Scl.

Une femelle.

MEGALOPHUS ÆQUATORIALIS (Scl.).

Une femelle adulte.

MYIOBIUS BARBATUS (Gm.).

Un exemplaire. M. Stolzmann dit que cet oiseau a l'habitude de porter sa queue étendue en éventail.

ORCHILUS PILEATUS (Tsch.).

Un exemplaire.

HETEROPELMA WALLACII, Scl.

Un exemplaire.

JULIAMYIA FELICIANA (Less.).

Trois femelles.

CERYLE INDA (L.).

Un jeune oiseau.

MALACOPTILA PANAMENSIS (Lafr.).

Un adulte et un jeune. Iris de l'oiseau adulte est rouge de sang, celui du jeune blanc sâle.

PIAYA RUTILA (Ill.).

Un exemplaire.

BROTOGERYS PYRRHOPTERA (Lath.).

Une femelle.

ACCIPITER BICOLOR (Vieill.).

Une femelle adulte tuée le 18 mai. Iris d'une belle couleur jaune.

ORTALIDA ERYTHROPTERA, Sel. et Salv. P. Z. S. 1875, p. 540.

Un exemplaire. Iris brun.

Selon l'opinion exprimée dans la lettre de M. Stolzmann on peut considérer la faune de Lechnugal comme intermédiaire entre celles de Tumbez et de Palmal, quoique nos voyageurs y ont trouvé beaucoup d'espèces qu'ils n'ont pas observées dans les deux dernières localités. La différence parmi les faunes de Tumbez et de Palmal est si grande qu'on peut à peine citer quelques espèces communes, comme *Ceryle cabanisii*, *Picolaptes souleyeti*, *Accipiter bicolor*, *Todirostrum cinereum*, *Myiozetetes similis*, *Polioptila albilora*, *Prionites microstephanus*, *Furnarius cinnamomeus*, *Myiarchus rubineus*, *Campylorhynchus balteatus*, *Cairina moschata*. Il suppose aussi que les trois avant-derniers oiseaux se sont établis dans le Palmal depuis qu'on a défriché le terrain pour l'établissement des *chaeras* (morceaux de terre cultivée au fond de la forêt).

3. Some Notes on the Madeiran Mollusk identified by the Rev. R. T. Lowe as *Achatina folliculus*, Gron. By the Rev. R. BOOG WATSON, F.R.S.E., F.G.S.

[Received March 19, 1877.]

In December 1875 I had the honour of presenting to the Zoological Society a paper "On the Generic Peculiarities of the distinctively Madeiran *Achatina* of Lowe"*. These peculiarities are:—1st, the extension of the mantle over the shell; and, 2nd, the presence of a mucous gland in the abruptly truncate tail. On the strength of these peculiarities I proposed the formation of a separate genus, under the name of *Lovea*, for this group, to which, from the examination of the animals, I was able to attach *Lovea (Achatina) melampoides*, Lowe, *L. tornatellina*, Lowe, *L. triticea*, Lowe, and *L. oryza*, Lowe; and I added my belief that these generic features would be "found common to all the distinctively Madeiran species of this group. Of course *Achatina acicula* and *Cochlicopa lubrica* (the *madrensis* of Lowe) fall off from it; for they certainly have not the

* See P. Z. S. 1875, p. 677.

characteristics of the genus;" and I went on to ask "Does the *Achatina folliculus*, Gron., a common European species, belong to this new genus or not? Surely, had it possessed the generic peculiarities mentioned above, the fact would long ago have been noticed. I have not yet been able to decide the question as regards the Madeiran species identified by Lowe as the *Achatina folliculus*, Gron."

I have at last, through the kindness of Mr. T. Vernon Wollaston and Mr. João Maria Moniz, been enabled to examine the living animal of the Madeiran species, and have, as I expected, found it to possess the generic features of *Lovea* as given above. It thus becomes increasingly desirable that some one who has the opportunity would make careful examination of the *Achatina folliculus*, Gron., in order to ascertain whether it presents these same generic features or not. In the mean time the identification of the Madeiran and the South-European species, based on the undeniable similarity of the shells, must be regarded as doubtful; and I propose for the Madeiran species the name of *Lovea wollastoni*, of which I have now to present the description.

Body. In general form very much like that of *Lovea tornatellina*, Lowe.

Colour. Yellow, towards the tail slightly orange, towards the head with a faint tinge of grey, which is darker towards the end of the tentacles. The sole of the foot is lemon-coloured, which is a little more translucent in front. A very slightly greyer line runs above the edge of the foot in front.

Mantle yellow, but a little whiter and less translucent, having a few whitish granules scattered in it. It spreads round and beyond the shell-edge; but my specimens had been long in captivity, were dry and unhappy, and thus the mantle was probably less extended than would normally be the case.

Tentacles. Upper long, very fine; lower short.

Sides scored with long tubercles, of which those above are long and narrow, stretching from above forwards and downwards; the others below and behind these first are squarer in shape, and stretch from before obliquely backwards. The head, neck, and tentacles are finely tubercled. The foot is bordered by a narrow line, above which is a fringe of squarish-shaped tubercles. Two close-set and well-marked lines of tubercles run backward from between the tentacles along the neck.

Seen from above, the *tail* ends in an attenuated blunt rounded point; seen in profile, it is abruptly cut off obliquely, the extreme upper corner being occupied by the mucous gland, the opening of which is covered by a flap which, when depressed, almost obscures that feature, but which, when the animal is in full vigour, is elevated into a short, sharp, triangular, projecting point.

Mr. Wollaston, in sending me these specimens, writes that Mr. Moniz "says that he obtained them with great difficulty, and, as usual, in S. Gonçalo parish."

In that locality alone have I ever found them, among the dead leaves of the *Opuntia tuna*.

4. List of Birds met with in North-eastern Queensland, chiefly at Rockingham Bay. By E. PIERSON RAMSAY, F.L.S. &c., Curator of the Australian Museum, Sydney. —Part III.¹

[Received March 21, 1877.]

198. CHORIOTIS AUSTRALIS.

Choriotis australis, Gould, Handbk. B. A. ii. p. 208.

Usually found on the open parts of the grass flats: this bird is not plentiful near Rockingham Bay; I met with it only on two or three occasions. I have described the eggs of this species in 'The Ibis,' 1867, p. 418.

199. ŒDICNEMUS GRALLARIUS.

Œdicnemus grallarius, Gould, Handbk. B. A. ii. p. 210.

The Stone-Plovers, or "Land-Curlews" as they are more commonly called, are very plentiful all over the district, both inland and on the sea-coast. A curious variety of the egg of this species is sometimes found; it is of a rich creamy buff, clouded with a duller tint, or irregularly and indistinctly blotched with dull brownish buff. On showing some of this variety to the late Mr. John Macgillivray, author of the 'Voyage of the Rattlesnake' &c., he assured me they were so remarkably similar to the one found by the late Commander J. M. R. Ince at Port Essington, and described by Mr. Gould² as that of *Esacus magnirostris*, that no doubt as to their identity remained in his mind. On every occasion that I have obtained the buff-coloured egg the accompanying one was of the usual heavily blotched variety, with but few markings at the thin end. This species never lays more than two eggs for a sitting, which vary a good deal in different localities. There are four very distinct varieties in the Dobroyde collection.

200. ESACUS MAGNIROSTRIS.

Esacus magnirostris, Gould, Handbk. B. Austr. ii. p. 213.

A pair of these interesting birds frequented the sand-pits in the neighbourhood of Cardwell during the time of my visit; they proved too wary to be approached within gun-shot; the white on the wings shows very conspicuously in flight. It is not a rare species, but always very difficult to obtain when found near any of the settlements.

201. LOBIVANELLUS LOBATUS (?).

Lobivanellus lobatus, Gould, Handbk. B. A. ii. p. 218.

I heard the cry of a Plover of this genus on one or two occasions, but had no opportunity of ascertaining for certain which species it

¹ Continued from P. Z. S. 1876, p. 123, and concluded.

² Handbk. Birds Austr. ii. p. 213.

was; the bird may have been *Lobivanellus personatus*, but more probably *L. lobatus*. The cry of the latter is well known to me; that of the former, to my knowledge, I never heard. I have been informed by Inspector Robert Johnstone, of the Herbert River, that Spur-wing Plovers occasionally visit that district. The eggs of *Lobivanellus lobatus* vary from rich *dark green* to *olive-brown*, with blackish spots and blotches.

202. SARCIOPHORUS PECTORALIS.

Sarciophorus pectoralis, Gould, Handbk. B. Austr. ii. p. 222.

I met with this species only on one occasion, about fifty miles inland, while enjoying the hospitality of Mr. Stone, Superintendent of "The Vale of the Herbert" station, the property of Walter Scott, Esq. In the extensive and well-grassed paddocks around the station a flock of these birds had taken up their abode. Mr. Stone informed me that they remain in the neighbourhood throughout the whole year; and being seldom if ever molested, they showed no symptoms of fear, quietly remaining while I walked within a few feet of them.

203. CHARADRIUS LONGIPES.

Charadrius longipes, Gould, Handbk. B. Austr. ii. p. 225.

I enumerate this species on the authority of Inspector Johnstone, who informs me the Golden Plover visits the Herbert district every winter.

204. ÆGIALITIS NIGRIFRONS.

Ægialitis nigrifrons, Cuvier; Gould, Handbk. B. Austr. ii. p. 232.

This species is not uncommon on the Herbert river, and is found dispersed over the whole of the eastern and southern portions of Australia, even venturing far inland. I have met with it high up on the Bogan and Bell rivers, and on the Murrumbidgee river, near Yass; it gives preference to the margins of inland lakes and lagoons rather than the sea-coast. J. S. Ramsay, Esq., a most persevering and successful oologist, found it breeding during the months of October, November, and December on the margins of the Bell river, at Cardington. There was always a difficulty in discovering the eggs, from their similarity to the adjacent ground on which they were laid, it being necessary to watch the birds to their eggs. James Ramsay, Esq., of Nanama, near Yass, has also sent me authentic eggs of this species, taken in that district, while others which I have received from Melbourne and South Australia all exhibit a similar style and colour in their markings. The eggs are always four in number, and usually placed with the thinner ends together, in a slight depression in the sand or pebbles near water; the ground-colour is of a rich creamy white when fresh, nearly obscured by numerous irregular angular markings and hair-lines of blackish brown, dark brown, and bluish slate-colour, the last appearing as if beneath the surface of the shell. In some specimens these markings are close together, giving a clouded appearance to the eggs, in others

about equally dispersed over the whole surface. In some light varieties they are less numerous at the thinner end; and these specimens are slightly smaller in size. Length 1·05 inch by 0·8 inch; the darker and most usual variety 1·1 inch in length by 0·85 inch in breadth.

205. *ÆGIALITIS RUFICAPILLA*.

Ægialitis ruficapilla, Gould, Handbk. B. Austr. ii. p. 235.

Unlike the preceding, this species is seldom found far from the sea; they frequent the sands and open salt-water flats, and are usually met with in small troops from five to ten in number; the nest (if it may be so called) is like all others of the genus I have met with, merely a slight depression in the sand or pebbles close to high-water mark; sometimes the eggs are placed among débris containing broken shells and coral &c., above the influence of the tide; they are usually four, but sometimes three, and occasionally only two (but four, I presume, is the correct number for a sitting), placed with the pointed ends together; and without any protection except that afforded them by their similarity to the surrounding objects among which they have been deposited, they are very difficult to be detected. Our collection contains eggs taken at Woolongong and various parts of the sea-coast of New South Wales, also from near Melbourne; but none show any material difference in coloration or form; in size they are slightly larger than those of *Ægialitis nigrifrons*, being 1·2 inch to 1·25 inch in length by 0·93 to 0·94 in breadth, of a light pale stone-brown or very light cream-colour, spotted sparingly with black dots and rather large irregular black blotches and markings, a few of the dots appearing as if beneath the surface of the shell.

They breed from October to December, and sometimes as late as January.

206. *ÆGIALITIS INORNATA*.

Ochthodromus inornatus, Gould, Handbk. B. Austr. ii. p. 237.

207. *ÆGIALITIS BICINCTA*.

Ochthodromus? bicinctus, Gould, Handbk. B. Austr. ii. p. 238.

Only once did I meet with these species—of the former a small troop on the sand-spits of the Herbert river; of the latter, one solitary bird remained for a few days on the sands in front of the settlement at Cardwell.

208. *HIMANTOPUS LEUCOCEPHALUS*.

Himantopus leucocephalus, Gould, Handb. B. Austr. ii. p. 246.

While ascending the Herbert river on the 25th of February 1874, and anxiously waiting for a stray shot at an Alligator (*Crocodilus biporcatus*); I met with the only specimen of this bird I noticed during my tour. Firing at the bird I disturbed the Saurian, much to the disgust of my companions, as this identical Alligator had of late

been helping himself rather freely to some of the Kanakas employed on the sugar-plantations. A few days afterwards, however, while returning from an unsuccessful Cassowary-hunt, I had the pleasure of seeing Inspector Johnstone dispatch the beast as it lay, with open mouth, on a sand-spit.

Mr. Johnstone informed me that the Stilted Plover was a very rare bird in that district; but, from the nature of the country and the extensive swampy flats and numerous lagoons, I should have thought the contrary was the case; however, although I remained in the district all through the wet season, I met with no other specimen. The eggs of this species will be found described in a previous number of the Society's 'Proceedings,' 1867, p. 600.

209. *RECURVIROSTRA RUBRICOLLIS.*

Recurvirostris rubricollis, Gould, Handbk. B. Austr. ii. p. 249.

This bird is very local in its habits, and never seems to be very plentiful in any part of the continent; it is met with occasionally in large flocks; and Inspector Johnstone informs me it sometimes is met with on the Lower Herbert. One or two were observed during my visit; but I failed to obtain any specimens.

210. *LIMOSA UROPYGIALIS.*

Limosa uropygialis, Gould, Handbk. B. Austr. ii. p. 252.

Very numerous on mud-flats and sand-spits at the mouth of the Herbert river.

211. *LIMNOCINCLUS ACUMINATUS.*

Limnocinclus acuminatus, Gould, Handbk. B. Austr. ii. p. 254.

A very common species, frequenting the margins of lagoons and swampy places in large flocks sometimes consisting of several hundred individuals.

212. *TRINGA TENUIROSTRIS.*

Tringa tenuirostris, Gould, Handbk. B. Austr. ii. p. 260.

I met with a small flock of this species on one occasion only, on the banks of the Herbert.

213. *ACTITIS HYPOLEUCUS.*

Actitis hypoleucis, Gould, Handbk. B. Austr. ii. p. 263.

I met with this pretty little Sandpiper but once, on the Herbert river, near the police camp.

214. *GLOTTIS GLOTTOIDES.*

Glottis glottoides, Gould, Handbk. B. Austr. ii. p. 265.

Common everywhere on margins of lagoons and mud-flats; usually found in small flocks from ten to twenty in number.

215. *STREPSILAS INTERPRES.*

Strepsilas interpres, Gould, Handbk. B. Austr. ii. p. 269.

The Turnstone is usually considered a rare species; and it certainly

is so in collections made in New South Wales. I found large flocks of Sandpipers, and among them a few of this species, on the extensive mud-flats at the mouths of the Mary and Fitzroy rivers, and had ample opportunities of watching their habits while stranded in a boat, high and dry, about the middle of an extensive mud-flat, thirty miles long by six miles wide. I spent the best part of a day in this position, waiting for the return of the tide, and, per force, amused myself watching the different species of Waders and Gulls, many of which came within a few yards of our boat.

216. *GALLINAGO AUSTRALIS.*

Gallinago australis, Gould, Handbk. B. Austr. ii. p. 271.

The Australian Snipe affords good shooting to the sportsman during the season. There were not many of this species in the Herbert district during my visit; but the few we obtained were among the finest and largest I have ever met with.

217. *RHYNCHÆA AUSTRALIS.*

Rhynchæa australis, Gould, Handbk. B. Austr. ii. p. 274.

That this species occasionally visits the districts near Rockingham Bay is proved by some fine specimens having been shot and skinned by Inspector Johnstone. These were procured a short time prior to my visit, and were still in his possession at the time of my sojourn under his hospitable roof.

The Painted Snipe is by no means a common bird; and although during an occasional very wet season this species may be obtained in tolerable numbers, yet its visits are very uncertain and few and far between. In New South Wales I have obtained specimens from the Clarence river and Lake George; but nowhere have I ever found it plentiful.

218. *NUMENIUS CYANOPUS.*

Numenius cyanopus, Gould, Handbk. B. Austr. ii. p. 277.

Common everywhere in suitable places and muddy flats along the coast, and occasionally may be found on the margins of lakes and lagoons inland a considerable distance.

219. *NUMENIUS UROPYGIALIS.*

Numenius uropygialis, Gould, Handbk. B. Austr. ii. p. 279.

220. *NUMENIUS MINOR.*

Numenius minor, Gould, Handbk. B. Austr. ii. p. 280.

I observed these species but once during my tour; and, under the same circumstances, I trust I shall not meet them again. Mud-flats are very interesting in their way, especially to the naturalist; but there can be too much of a good thing. Both species are dispersed rather plentifully over the whole of the southern and eastern portions of Australia; and I have received one specimen of *N. minor* from the Lower Darling river, shot on the margins of some of the numerous inland lakes.

221. *CARPHIBIS SPINICOLLIS.*

Carphibis spinicollis, Gould, Handbk. B. Austr. ii. p. 282.

Met with once only, during the wet season, on the Lower Herbert river, in small flocks.

222. *THRESKIORNIS STRICTIPENNIS.*

Threskiornis strictipennis, Gould, Handbk. B. Austr. ii. p. 284.

I found this species on an extensive mud-flat at the mouth of the Fitzroy river, and have also received specimens from Port Denison. Mr. Johnstone informed me that it occasionally visited the Herbert river.

223. *IBIS (FALCINELLUS) IGNEUS.*

Ibis (Falcinellus) igneus, Gould, Handbk. B. Austr. ii. p. 286.

I give this species on the authority of Mr. Johnstone, whom I found well acquainted with the bird, and who had obtained a specimen a short time prior to my visit.

224. *PLATALEA REGIA.*

Platalea regia, Gould, Handbk. B. Austr. ii. p. 287.

225. *PLATALEA FLAVIPES.*

Platalea flavipes, Gould, Handbk. B. Austr. ii. p. 288.

These species are seldom met with in Northern Queensland. I have received *P. regia* from Port Denison, where it was considered a very rare bird; and *P. flavipes* was observed near the mouth of the river Fitzroy, a single specimen only.

Mr. Robert Johnstone informed me that Spoonbills were occasionally seen on the Upper Herbert river; but he did not identify the species with certainty.

226. *GRUS AUSTRALASIANA.*

Grus australasianus, Gould, Handbk. B. Austr. ii. p. 290.

“Native Companions” were found very plentiful in all the swamps in the Herbert district. Early in the morning their hoarse croaking cry was most frequently heard.

227. *XENORHYNCHUS AUSTRALIS.*

Xenorhynchus australis, Gould, Handbk. B. Austr. ii. p. 293.

Found in tolerable numbers, in pairs, throughout the district, particularly on the sand-spits and shallows of the Herbert river; they were very wary, and at all times difficult to approach. I was much amused watching a pair of these birds stalking round a large Crocodile sunning himself on one of the numerous sandbanks of the river—the birds carefully eyeing the Saurian, and the Saurian patiently waiting until one of them should come within the swing of his tail (of which the birds were careful to keep out of range). What excited their curiosity I cannot imagine; they must have seen dozens of Crocodiles in their time.

228. ARDEA SUMATRANA.

Ardea sumatrana, Gould, Handbk. B. Austr. ii. p. 296.

I met with this species on several of the rivers and estuaries from Moreton Bay to Rockingham Bay; I noticed several of them in Wide Bay, have received specimens from Cleveland Bay, and also observed them at the mouth of the Fitzroy river and on the Herbert river.

I am indebted to my friend the late Charles Coxen, Esq., of Brisbane, for a fine specimen, shot on the Brisbane river; and I have observed them as far south as the Clarence river, where the late Mr. John Macgillivray obtained a specimen. This species is always difficult to obtain, frequenting the extensive mud-flats, where it is impossible to walk, and seldom coming within shot from the shore. A pair were observed, accompanied by two young, well able to fly, in the month of December, showing that this species breeds early in the year.

229. ARDEA PACIFICA.

Ardea pacifica, Gould, Handbk. B. Austr. ii. p. 297.

Found (by no means rare, and dispersed usually singly or in pairs) over the whole district, in the neighbourhood of rivers and swamps, also occasionally on the sea-shore mud-flats. They were not difficult to approach; and numerous examples might have been obtained. This species appears to be distributed over the whole of the north-eastern, eastern, and southern portions of Australia; it is common in the Hunter district in New South Wales, and occasionally still found on the Paramatta river near Sydney, but more plentiful further south.

230. ARDEA NOVÆ-HOLLANDIÆ.

Ardea novæ-hollandiæ, Gould, Handbk. B. Austr. ii. p. 299.

Common everywhere along the coast as far north as Cardwell, and extending a considerable distance inland. The eggs are two in number, of a light bluish green colour; the nest is a rough structure of sticks, built in the larger forked branches of trees, often at a considerable distance from water.

231. HERODIAS ALBA.

Herodias alba, Gould, Handbk. B. Austr. ii. p. 301.

This is the common White Crane of New South Wales, and is found plentiful on the Hunter river, and sometimes on the shores of Port Jackson, but more plentiful to the north. I found it numerous in Wide Bay and Moreton Bay; and many were met with on the mud-flats at the mouths of the various rivers and creeks as far north as Cooktown. Its range extends to Cape York and New Guinea. I have always found them solitary or in pairs.

232. HERODIAS EGRETTOIDES.

Herodias egrettoides, Gould, Handbk. B. Austr. ii. p. 303.

This species is widely dispersed along the shores of Australia, and

met with in similar situations to the preceding (*H. alba*). I have found it a considerable distance inland on the rivers Hunter, Clarence, and Richmond; it is more plentiful to the northward of New South Wales, and found rather numerous in Moreton Bay and Wide Bay, and at the mouth of the Fitzroy river, and near Port Denison. It is not a common species about Cardwell; but Inspector Johnstone, of the Herbert river, informed me that they were more plentiful a little further north, on the Johnstone river and Moryllian harbour.

233. *HERODIAS GARZETTA*.

Herodias garzetta, Gould, Handbk. B. Austr. ii. p. 305.

This species is a very scarce bird on the Australian coast; I have never met with it but once in a state of nature, at the mouth of the Brisbane river. I have seen only three examples in Australian collections, all of them obtained from Queensland.

234. *DEMIEGRETTA JUGULARIS*.

Demiegretta jugularis, Gould, Handbk. B. Austr. ii. sp. 555 & 556, pp. 307-309.

Demiegretta greyi, *ibid.* p. 309.

I did not meet with this species myself; but Mr. George Masters informs me that it is found rather plentiful on all the reefs in Northern Queensland, and that *D. jugularis* and *D. greyi* are one and the same species. From an examination of a fine series of these birds in the Macleayan Museum at Elizabeth Bay, I quite concur with Mr. Gould's and Mr. Masters's opinion. Remains of the slaty blue being found on the primaries and wing-coverts of some of the white birds tends to prove that *D. greyi* is but the adult of *D. jugularis*.

235. *NYCTICORAX CALEDONICUS*.

Nycticorax caledonicus, Gould, Handbk. B. Austr. ii. p. 311.

This handsome species has a very extensive range, it is plentiful, and breeds among the mangroves on the Hunter river, and as far south as Illawarra. It is found equally plentiful as far north as Cardwell, where, on the Herbert river, it was one of the most common species. Mr. Gould remarks that it "is universally dispersed over the continent of Australia." I have also seen what I believe to be a young bird of this species from New Ireland, collected there by the Rev. G. Brown.

236. *BOTAURUS POICILOPTILUS*.

Botaurus poiciloptilus, Gould, Handbk. B. Austr. ii. p. 313.

The Australian Bittern is far more plentiful in the Illawarra and southern districts of New South Wales than in any other part of the country I have visited. I have seen specimens from the lakes and marshes in the southern parts of Victoria, near Ballarat, and have also noticed it on the Herbert river, in the Rockingham-Bay district, where it is considered a rare bird, although that part of the country

is admirably adapted for its habits, abounding in extensive swamps and lagoons. I have also met with, I believe, the same species in New Zealand. They are still found to be not rare within a few miles of Sydney; but the Illawarra district is the great stronghold of this species.

237. *BUTOROIDES FLAVICOLLIS*.

Butoroides flavicollis, Gould, Handbk. B. Austr. ii. p. 315.

The yellow-necked Mangrove-Bittern is plentiful in situations suitable to its habits all over Queensland. I found this species more common there than in New South Wales. In the extensive mangrove swamps and mud flats at the mouth of the Herbert river it is one of the most common birds.

238. *ARDETTA PUSILLA*.

Ardetta pusilla, Gould, Handbk. B. Austr. ii. p. 319.

I am happy to report that this beautiful little species is still plentiful in the neighbourhood of Cleveland Bay and also in the Herbert-river district; from both places have I received specimens. The species was once tolerably numerous near Sydney; and there are still specimens in the Dobroyde collection which were shot at Botany Bay and near Newtown. I observe no difference in plumage or size in the Northern Queensland specimens and those shot near Sydney.

239. *PORPHYRIO MELANOTUS*.

Porphyrio melanotus, Gould, Handbk. B. Austr. ii. p. 321.

Common all over the country, in similar situations to those frequented by it in New South Wales. The "Red-bill" prefers the swamps and extensive lagoons; but where such places are not met with readily, it takes to the banks and margins of the rivers. This species is easily domesticated, and, even in the wild state, when not disturbed, becomes very tame, entering the gardens and farm-yards and feeding with the poultry, to the young of which they prove very destructive. In certain parts of the country, where they are numerous, they do considerable damage to the crops, especially to the young maize. They are also very fond of the Indian corn when ripe: perching on the side of the stems, they detach the "cobs," which they hold steady on the ground with one foot while they pick off and eat the grains. I have seen them eating pieces of cooked and raw meat, holding them in the same way. The nest is a rough structure of rushes and water-weeds &c., placed among the reeds and sedges near the water, or built among reeds in the lagoons, at a considerable distance from the edge, just above water-mark. The eggs are from three to five in number, of a light brown or yellowish stone-colour, varying considerably in tint and in the shape of the markings, but usually spotted and blotched with umber, dark blackish brown, and slaty grey. The young are of a uniform blackish slate-colour on leaving the nest.

240. *TRIBONYX VENTRALIS*.

Tribonyx ventralis, Gould, Handbk. B. Austr. ii. p. 325.

I do not remember meeting with this species at Rockingham Bay; but I have received specimens from Port Denison (where, at certain seasons, it appears to be plentiful), some miles inland.

241. *GALLINULA TENEBROSA*.

Gallinula tenebrosa, Gould, Handbk. B. Austr. ii. 328.

Not so plentiful in any part of Queensland as in New South Wales. I found it, however, thinly distributed as far north as Rockingham Bay, in such situations as are preferred by the *Porphyrio melanotus*.

242. *GALLINULA RUFICRISSA*.

Gallinula ruficrissa, Gould, Suppl. Bds. Austr. vol. i. pl. 79.

A specimen of this rare species was obtained a few miles from Brisbane, in 1873.

I have also examined a skin obtained by Mr. A. Goldie at Port Moresby, New Guinea, the dimensions of which are as follows—total length 9·5 inches, wing 5·5, tail 2·5, tarsus 2, bill 1·2, middle toe 2, its nail 0·3, hind toe 0·75, its nail 0·35. The under tail-coverts are not so bright as in Mr. Gould's figure; and the back is of a more uniform tint.

243. *PARRA GALLINACEA*.

Parra gallinacea, Gould's Handbk. B. Austr. ii. p. 330.

This Parra is tolerably abundant throughout the swampy regions which abound over the eastern portion of Queensland and north-eastern parts of New South Wales. I have obtained specimens as far south as the Clarence river in New South Wales, its most southern limit, and as far north as the Herbert river in the Rockingham-Bay district. It is found most plentiful in the Rockhampton district wherever the swamps and lagoons occur; the leaves of the gigantic *Nymphaea* and *Nelumbium* afford a safe retreat for this species. I know of few more interesting or more pleasing sights than a troop of this handsome *Parra* wandering among the bright blue and crimson blooms of the giant waterlilies which abound in almost every sheet of water of any extent in North-eastern Queensland.

244. *HYPOTÆNIDEA PHILIPPENSIS*.

Hypotænidea philippensis, Gould, Handbk. B. Austr. ii. p. 334.

Universally dispersed over the whole of the Australian and South-Sea Islands, and particularly plentiful in the cane-fields of the sugar-growing districts of Queensland.

I have before me a very interesting variety of this species from one of the South Sea-Islands of the Fiji group which has the chin, throat, chest, and breast of a light ashy grey, with a few indistinct bars of slaty ash-colour or greyish slate on the chest and breast; the abdomen and flanks are much the same as in ordinary individuals of the same species; the bill is orange at the base of the lower man-

dible and on the outer margins of the upper. The Australian Museum has also obtained specimens from the Duke-of-York Island and New Ireland, as well as from the Samoan group: in some of the specimens from these last-mentioned islands, the pectoral band is altogether wanting; the same peculiarity occurs in some Fijian examples.

245. RALLINA TRICOLOR.

Rallina tricolor, Gould, Suppl. B. Austr. vol. i. pl. 78.

I have no other information to give on the habits of this species than that contained in my "Notes" in the Society's 'Proceedings' for 1875, p. 603, where will be found a description of the young and the eggs.

246. PORZANA FLUMINEA.

Porzana fluminea, Gould, Handbk. B. Austr. ii. p. 339.

247. PORZANA PALUSTRIS.

Porzana palustris, Gould, Handbk. B. Austr. ii. p. 340.

248. PORZANA TABUENSIS.

Porzana tabuensis, Gould, Handbk. B. Austr. ii. p. 341.

249. PORZANA (ERYTHRA) QUADRISTRIGATA.

Porzana (Erythra) quadristrigata, Gould, Handbk. B. Austr. ii. p. 343.

All except the first-mentioned of these species I have found by no means rare in Queensland. *P. quadristrigata* was the most common species in the Rockingham-Bay district. *P. tabuensis* and *palustris* were plentiful about Rockhampton and on the swamps in the neighbourhood of the mouth of the Burnett river; *P. fluminea* I met with but once, at Port Mackay.

250. CHENOPIS ATRATA.

Chenopsis atrata, Gould, Handbk. B. Austr. ii. p. 346.

The Black Swan is found rarely in Queensland north of the Burnett river, which I think was the only place I met with it. I have been informed that it sometimes occurs during wet seasons on the Herbert river.

251. ANSERANAS MELANOLEUCA.

Anseranas melanoleuca, Gould, Handbk. B. Austr. ii. p. 352.

Plentiful throughout the swampy districts all over the south and eastern portions of Australia. I have examined specimens from South Australia, and met with it almost every day while encamped on the Herbert river. The young were brought in by the natives on several occasions during the months of March and April.

252. CHLAMYDOCHEN JUBATA.

Chlamydochen jubata, Gould, Handbk. B. Austr. ii. p. 354.

This fine species of Wood-Goose is not by any means so plentiful

in Queensland as in New South Wales. I met with them only on one or two occasions, at the mouth of the Burnett river, and inland about fifty miles from the coast, near the head-waters of the Herbert river.

253. *NETTAPUS PULCHELLUS.*

Nettapus pulchellus, Gould, Handbk. B. Austr. ii. p. 357.

This species is one of the rarest in our Australian collections, occasional stragglers only visiting the eastern portions of Queensland, whence I have only seen three skins. It is at times found at Cape York; and Inspector Johnstone, of Cardwell, informed me that he once met with a specimen in one of the numerous swamps of the Herbert district.

Mr. Wilcox, of the Clarence river, I believe once obtained it, in company with the common species, *N. albipennis*, from one of the swamps near Grafton.

254. *NETTAPUS ALBIPENNIS.*

Nettapus albipennis, Gould, Handbk. B. Austr. ii. p. 359.

This is one of the most common species in the neighbourhood of Rockhampton and on the Fitzroy river; it is also plentiful on the Burnet-river swamps.

255. *TADORNA RAJAH.*

Tadorna rajah, Gould, Handbk. B. Austr. ii. p. 360.

I found this fine Wood-Duck breeding in holes in the hollow limbs of trees during the months of December and January. It is a common species all over Queensland north of the Mary river. I have received specimens from Port Denison and Rockingham Bay, and also examined specimens from Port Moresby, in New Guinea. The Port-Moresby birds have a much narrower pectoral band than is found in the Australian examples I have seen.

256. *ANAS SUPERCILIOSA.*

Anas superciliosa, Gould, Handbk. B. Austr. ii. p. 363.

257. *ANAS PUNCTATA.*

Anas punctata, Gould, Handbk. B. Austr. ii. p. 365.

258. *DENDROCYGNA GOULDI.*

Dendrocygna gouldi, Gould, Handbk. B. Austr. ii. p. 374.

D. vagans? auct.

259. *DENDROCYGNA EYTONI.*

Dendrocygna eytoni, Gould, Handbk. B. Austr. ii. p. 375.

These four species I found plentiful in the swamps and rivers of North-eastern Queensland. The first three mentioned are the most plentiful and widely distributed.

D. gouldi I have seen even from southern parts of New S. Wales,

and some in the flesh said to have been obtained from the lakes near Ballarat, in South Australia. It is one of the most common ducks north of the Burnet river.

D. eytoni is abundant near Port Denison; and from Rockingham Bay I have also obtained specimens. An egg taken from the oviduct by Mr. Rainbird, of Port Denison, measures 1.95 inch by 1.5 in breadth; it is of a light creamy white, and slightly ovate, and appears to be comparatively a very small egg for a bird of this size to lay.

260. NYROCA AUSTRALIS.

Nyroca australis, Gould, Handbk. B. Austr. ii. p.377.

Met with once in the swamps of the Herbert-river district.

261. LARUS PACIFICUS.

Larus pacificus, Gould, Handbk. B. Austr. ii. p. 385.

I found this noble species rather plentiful on the mud-flats and margins of many of the rivers at low tides. They ascend the rivers in company with *Xema jamesoni* to a considerable distance. I noticed several pairs near the wharfs at Rockhampton.

262. XEMA JAMESONI.

Xema jamesonii, Gould, Handbk. B. Austr. ii. p. 387.

Common all along the coast from Melbourne to Cape York.

263. STERCORARIUS CATARRHACTES.

Stercorarius catarrhactes, Gould, Handbk. B. Austr. ii. p. 389.

264. SYLOCHELIDON CASPIA.

Sylochelidon caspia, Gould, Handbk. ii. B. Austr. p. 392.

265. ? THALASSEUS POLIOCERCUS.

? *Thalasseus poliocercus*, Gould, Handbk. B. Austr. ii. p. 396.

266. STERNA MELANORHYNCHA.

Sterna melanorhyncha, Gould, Handbk. B. Austr. ii. p. 398.

I obtained these Terns on one occasion in Rockingham Bay; they did not appear to be rare in that neighbourhood.

267. STERNULA PLACENS.

Sternula placens, Gould, Ann. & Mag. Nat. Hist. 4 ser. vol. vii p. 192.

I first found this beautiful species December 1865, at the mouth of the Richmond river, when I took it for *S. nereis*. I have repeatedly found them at different times during the last six years from as far south as Illawarra to Rockingham Bay in North-eastern Queensland, where it appears to be one of the most common species of Tern.

268. *HYDROCHELIDON FLUVIATILIS.*

Hydrochelidon fluviatilis, Gould, Handbk. B. Austr. ii. p. 406.

This species I have obtained from the Richmond river and Rockingham Bay; it was also tolerably plentiful at the time of my visit in December 1870, at Rockhampton, on the Fitzroy river, and on the Mary river.

269. *GELOCHELIDON MACROTARSA.*

Gelochelidon macrotarsa, Gould, Handbk. B. Austr. ii. p. 403.

I found this fine Tern on the Brisbane river in 1873-4, and also obtained a fine pair of adult specimens from the Clarence river. I met with it at Rockingham Bay, at the mouths of the Herbert river, and also at a considerable distance up the stream, about 20 miles from the mouth. It is still rare in Australian collections.

270. *ANOUS STOLIDUS.*

Anous stolidus, Gould, Handbk. B. Austr. ii. p. 413.

Common on all parts of the east coast.

271. *DIOMEDEA MELANOPHRYS.*

Diomedea melanophrys, Gould, Handbk. B. Austr. ii. p. 438.

Met with only on one occasion off the coast near Gladstone, Port Curtiss.

272. *PELECANUS CONSPICILLATUS.*

Pelecanus conspicillatus, Gould, Handbk. B. Austr. ii. p. 486.

I noticed this fine species breeding in great numbers on a flat-topped rocky island off the coast near Cleveland Bay. Numbers were soaring over the island, some close to the surface, others sitting quite motionless on the ground, the neck held upright, with the head and bill at right angles to it, giving the group quite a grotesque appearance.

273. *PHALACROCORAX NOVÆ-HOLLANDIÆ.*

Phalacrocorax novæ-hollandiæ, Gould, Handbk. B. Austr. ii. p. 488.

This fine species is common all along the eastern coast; it ascends the river to a considerable distance, and seems as much at home in fresh as in salt water.

274. *PHALACROCORAX MELANOLEUCUS.*

Phalacrocorax melanoleucus, Gould, Handbk. B. Austr. ii. p. 493.

275. *PHALACROCORAX STICTOCEPHALUS.*

Phalacrocorax stictocephalus, Gould, Handbk. B. Austr. ii. p. 495.

Both common species, frequenting the bays and inlets of the sea

and the mouths of the rivers, swamps, and lagoons, and even water-holes at a considerable distance inland. They nest in trees overhanging the rivers or waterholes, making a rough nest of water-weeds and débris: lay 2 to 3 eggs.

I met with both species in a small lagoon some twenty miles inland in the Herbert-river district in March 1874.

A large white-breasted species was seen on several occasions in Rockingham Bay; but none were shot, and I was too far off to identify the bird; but it was probably *P. varius*.

276. *PLOTUS NOVÆ-HOLLANDIÆ*.

Plotus novæ-hollandiæ, Gould, Handbk. B. Austr. ii. p. 496.

This is a widely distributed species, found on all the rivers as far north as Cape York. I have also met with it at a great distance inland. That its range extends to New Guinea is proved by the fact that the Museum has lately received a specimen from the "Laloki river," near Port Moresby, about fifteen miles from the settlement. There are some slight differences in the style of coloration of the New-Guinea specimen, but scarcely sufficient for the foundation of a new species.

277. *PHAËTON PHÆNICURUS*.

Phaëton phænicurus, Gould, Handbk. B. Austr. ii. p. 501.

Seen occasionally off Hinchinbrook Island.

278. *SULA AUSTRALIS*.

Sula australis, Gould, Handbk. B. Austr. ii. p. 504.

Rather plentiful in the Bay off Cardwell.

279. *SULA FIBER*.

Sula fiber, Gould, Handbk. B. Austr. ii, p. 507.

Occasionally seen in the bay, but more plentiful off a small reef to the south-east of Hinchinbrook Island, and near the mouth of the Herbert river.

280. *PODICEPS*, sp. inc.

This I take to be *P. gularis*. Only met with on one occasion, in a chain of lagoons near the Herbert river.

APPENDIX.

Shortly after my return from Queensland, Mr. Sub-Inspector Armit, who had taken great interest in my pursuits, forwarded me a small collection of birds from the neighbourhood of Georgetown, and also some very interesting notes on the avifauna of that district. From this collection I can add the following species which I had not observed myself:—

HALCYON PYRRHOPYGIA, Gould, Handbk. B. Austr. i. p. 130,

FALCO HYPOLEUCUS, Gould, Handb. B. Austr. i. p. 24,

MYZOMELA PECTORALIS, Gould, Handb. B. Austr. i. p. 557,

several specimens in various stages of plumage; and the following, which may claim to be added to this list:—

281. PARDALOTUS RUBRICATUS.

Pardalotus rubricatus, Gould, Handbk. B. Austr. i. p. 158.

This species builds a nest very similar to that of *P. melanocephalus* and *S. punctatus*, digging a tunnel in a soft bank, and making a loosely woven structure in a hollowed-out chamber at the end. The eggs are four in number, white, and about the same size as those of *P. melanocephalus*. In length 0·7 inch by 0·55 in breadth.

Hab. Ethridge river, Queensland.

282. PARDALOTUS UROPYGIALIS.

Pardalotus uropygialis, Gould, Handbk. B. Austr. i. p. 166.

Mr. Armit informs me that this bird breeds in the same manner as the foregoing, and that its habits and actions are the same.

Hab. Ethridge river, Queensland.

283. PACHYCEPHALA FALCATA.

Pachycephala falcata, Gould, Handbk. B. Austr. i. p. 213.

In these specimens the male has the chest of a dull light sandy brown.

284. PTENÆDUS RUFESCENS.

Ptenædus rufescens, Gould, Handbk. B. Austr. i. p. 397.

285? MALURUS CRUENTATUS.

Malurus cruentatus, Gould, Handbk. B. Austr. i. p. 334.

286. POËPHILA MIRABILIS.

Poëphila mirabilis, Homb. et Jacq.; Gould, Handbk. B. Austr. i. p. 421.

One female sent confirms the fact of *P. gouldiæ* being the female of *P. mirabilis*. Mr. Armit found them breeding. The male bird had, he states, the face carmine red.

287. PTILOTIS SONORA.

Ptilotis sonora, Gould, Handbk. B. Austr. i. p. 504.

288. PTILOTIS UNICOLOR.

Ptilotis (Stomiopera) unicolor, Gould, Handbk. B. Austr. i. p. 523.

289. ENTOMOPHILA RUFIGULARIS.

Entomophila (Conopophila) rufigularis, Gould, Handbk. B. Austr. i. p. 533.

290. MELITHREPTES LATIOR.

Melithreptus latior, Gould, Ann. & Mag. Nat. Hist. ser. 4, vol. xvi. p. 287.

291. CALOPSITTA NOVÆ-HOLLANDIÆ.

Calopsitta novæ-hollandiæ, Gould, Handbk. B. Austr. ii. p. 84.

292. PTILOSCLERA VERSICOLOR.

Ptilosclera versicolor, Vigors; Gould, Handbk. B. Austr. ii. p. 98.
Some fine specimens were obtained on Carron's Creek.

This brings my list of Birds of North-eastern Queensland &c. to a close. I might have added several more to it had I been enabled to remain longer in some of the inland districts; and I regret also that I did not shoot specimens of some of the species. These consequently I have not been able to determine with that degree of certainty I should like; for I find in one or two instances the birds I then took to be identical with our New-South-Wales species have turned out to be *new*. This is the case with *Oreocincla*, sp. No. 110, which I find to be *O. iodura* of Mr. Gould.

I also observed that the *Sittella leucocephala*, from the neighbourhood of Port Denison, has a *white* band through the wing instead of a reddish or "*rusty-red*" one, as described by Mr. Gould. In other respects it is almost exactly the same. I have only observed three specimens with this peculiarity, but am daily expecting a large series from Bowen, when I will make some further remarks, and give a fuller description of the bird; for the present I propose the name of *albata* for the Port-Denison specimens, distinguished by having a *white band through the wing*, commencing on the *first primary* and *extending to the 9th quill*.

SITTELLA ALBATA, sp. nov.

Head and neck, a small spot at the base of the primaries on the underside of the wing, a band through the wing as far as the 9th quill, the upper tail-coverts, and the tips of all the tail-feathers except the centre two, snow-white; under surface ashy white, with a broad dark-brown stripe down the centre of each feather; under tail-coverts of a darker brown, tipped and margined anteriorly with white; back and scapulars brown, darker in the centres of the feathers; wing- and tail-quills blackish brown, the former crossed with a white band as far as the ninth quill; bill at the base, the legs and feet, and skin round the eye yellow, remainder of the bill black. Length 3·7 inches, wing 3, tail 1·5, tarsi 1·7, bill 0·5, bill from gape 0·7.

Finally, I may as well correct an error which occurs in the name of sp. no. 57, Part I. of this paper (P. Z. S. 1875, p. 584): *Artamus cinereus* should be *Artamus albiventris*, Gould. And under sp. no. 125, *Stigmatops subocularis*, the latter part of my remarks refer to *Stigmatops ocellaris*, the Sydney species.

5. On a new Species of *Sthenurus*, with Remarks on the Relation of the Genus to *Dorcopsis*, Müller¹. By Professor OWEN, C.B., F.R.S., F.Z.S., &c.

[Received April 4, 1877.]

(Plates XXXVII. & XXXVIII.)

The present species of extinct Kangaroo is founded on a fossil fragment of skull including the molar series of both sides of the upper jaw with the intervening bony palate (see Plate XXXVII.).

The reference to the genus *Sthenurus* in Prof. Garrod's excellent memoir on *Dorcopsis luctuosus*² encourages me to think the following notes may not be unacceptable to the Society, which has occasionally admitted illustrations of extinct animals into its publications.

The fossil was found in a "rocky alluvial deposit" in the shaft of a gold-lead in the county of Phillip, New South Wales, Australia, and was transmitted to me by the Rev. William Branthwaite Clarke, M.A., F.R.S., the veteran geologist of New South Wales. The fossil is in a massive petrified condition.

The genus *Sthenurus* is chiefly characterized by the configuration and fore-and-aft extent of the premolar (Plate XXXVIII. figs. 1, 5, 12, *p 3*), which exceeds that of the following molar (ib. figs. 5, 12, *d 4*) commonly to the extent of one half of the next molar, *m 1*. The premolar in the upper jaw has an outer (ib. figs. 3, 7, 14 *d*) and an inner (ib. *e*) trenchant plate, the latter being lower in extent, almost basal in position; the plates are united together by two or more low transverse ridges. The crown of the tooth is thus partly trenchant, partly tritulant.

The molars have the two transverse lobes (ib. figs. 4, 7, 8, 14, 15, *a* and *b*) of the macropodal type, well developed, with their summits trenchant and slightly curved prior to abrasion, with a "prebasal ridge" (ib. figs. 4, 8, 15, *f*) and a low and small "mid link" (ib. fig. 8, *r*), continued at almost a right angle forwards from the inner inflection of the fore lobe. The hind lobe of the last molar (*m 3*) is a little narrower than the fore lobe.

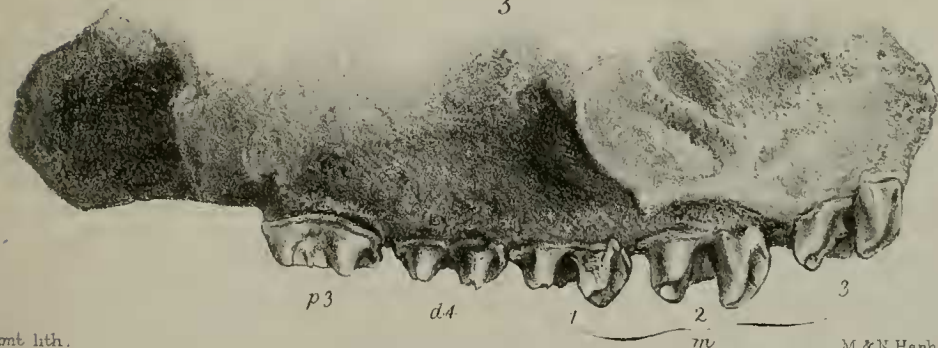
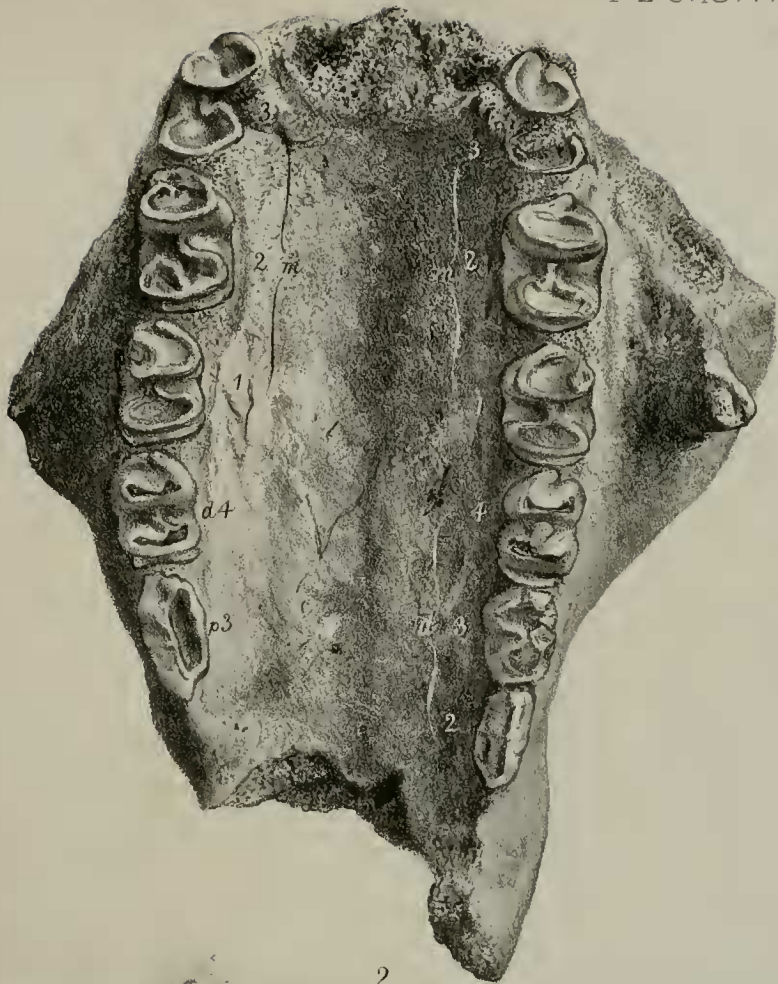
The upper incisors (ib. fig. 11) work on the same horizontal plane; and the crown of the third (*i 3*) exceeds that of the first (*i 1*) in fore-and-aft extent.

The smallest species of the extinct genus known at the date of my eighth paper on the "Fossil Mammals of Australia"³ was the type one (*Sthenurus atlas*) in which the fore-and-aft extent of the crown of the upper premolar (ib. figs. 5, 6, 7, *p 3*) is 9 lines, that of the entire permanent series of upper molars being 2 inches 11 lines. A second species of *Sthenurus* (*S. brehus*) has the upper premolar (ib. figs. 12, 13, 14, *p 3*) 10 lines in fore-and-aft extent; that of the perma-

¹ Zoogd. v. den Indischen Archipel, pt. 4, pl. xxiii. (skull and dentition, figs. 7 and 8), plate xxiv. fig. 7 (*Hypsiprymnus brunii*; *Dorcopsis* in text) 1841.

² Proc. Zool. Soc. 1875, pp. 48 and 58.

³ Phil. Trans. 1874, p. 245, pls. xxii. and xxiv.

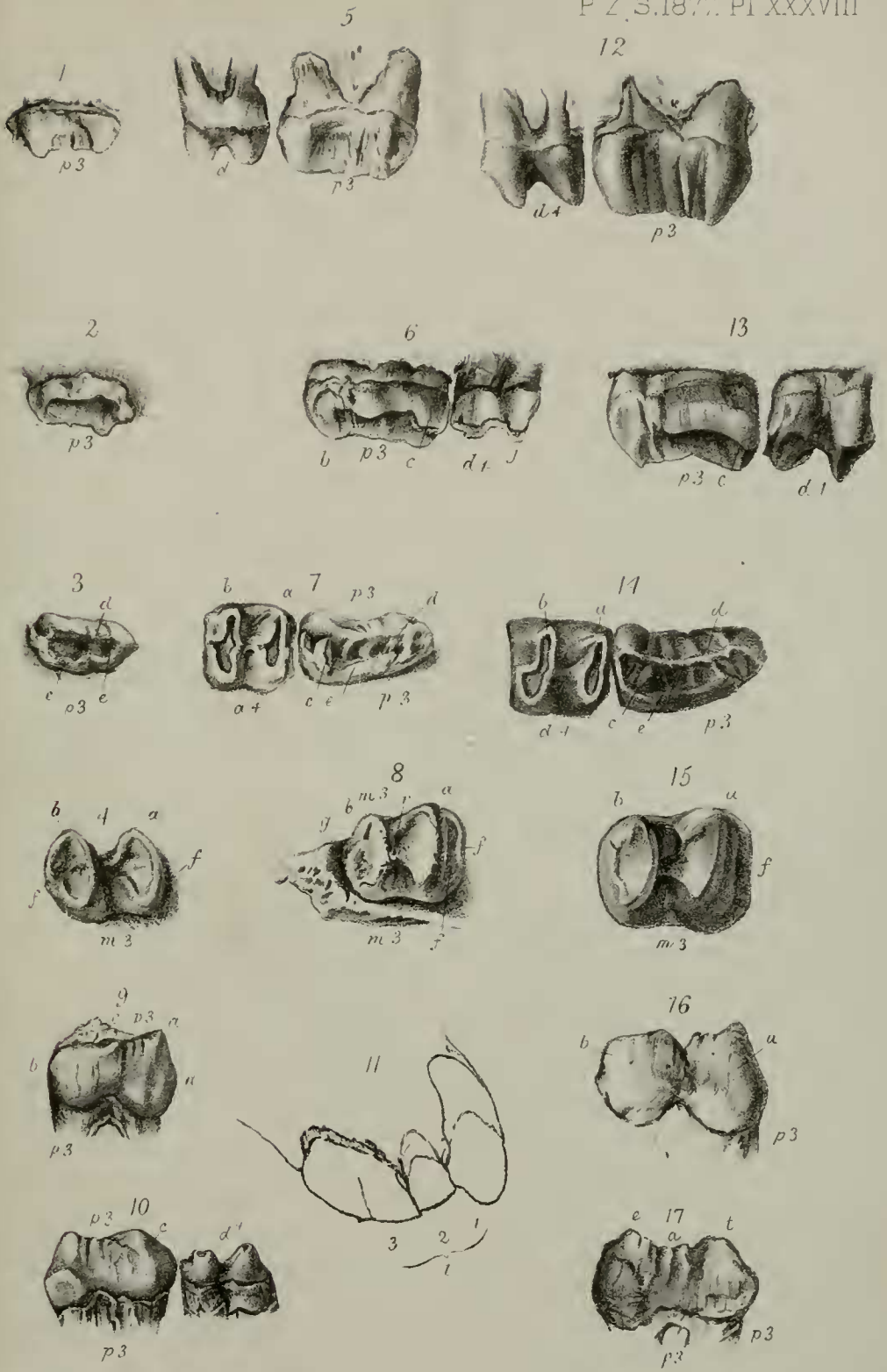


Smt lith.

M & N Hanhart imp

STHENURUS MINOR





J. Sent lith.

M&N. Harnack sculp.



nent series of upper molars is 3 inches 4 lines¹. In *Osphranter rufus* this series is 2 inches 3 lines, reduced by loss of the premolar to 2 inches (as in Trans. Zool. Soc. vol. ix. pl. 74. figs. 1 and 3); and these dimensions are not exceeded in *Macropus major*.

The extinct Kangaroo, represented by the subjects of Plate XXXVII. somewhat exceeded the above largest known existing species. The fragment of skull is a little larger than the corresponding part of a full-grown *Macropus major*, with the last molar in place and use and the premolar shed; it consists of both maxillaries with their respective (right and left) molar series, the intervening bony palate, and a portion of the right orbit and zygoma with the descending masseteric process.

The dentition is in an instructive phase. The left series of grinders shows the premolar (ib. fig. 1), p_3 , in place, and the last molar, m_3 , protruding from the formative cell. The right series shows the deciduous predecessors (d_2 , d_3) of p_3 in place, and m_3 less advanced than on the left side. Thus there are five functional grinders on the right side and four on the left side of the upper jaw. The formula of the left series is p_3 , d_4 , m_1 , m_2 (m_3 not fully emerged); the formula of the right series is d_2 , d_3 , d_4 , m_1 , m_2 (m_3 less advanced). Accordingly the outer parietes of the right maxillary were removed above d_2 and d_3 with the usual result, the crown of p_3 and beginning of its roots becoming exposed in the formative cell (Plate XXXVII. fig. 2, p_3).

The fore-and-aft extent of the left permanent series of upper molars is 2 inches 10 lines, that of the four bilophodont molars (corresponding with those shown in the skull of *Osphranter rufus*, Trans. Zool. Soc. tom. cit.) is 2 inches 3 lines; but the inferiority of size of the present species of *Sthenurus* to the two previously known species suggested the "nomen triviale." *Sth. minor*, however, surpasses in size any known existing Kangaroo, but is the smallest known of its genus.

In the comparisons required for taxonomic conclusions as to these large extinct Kangaroos, I found, in 1873, the nearest approach to the character of the premolar of *Sthenurus* in some small Kangaroos of the genus *Halmaturus*, and I figured the dentition of *H. ualabatus*² (Phil. Trans. tom. cit. plate xxiv. figs. 1, 2, 3, 10, 11, 12) as showing the nearest resemblance to that of *S. atlas* (ib. ib. figs. 4, 5, 6, 7, 8). But the premolar of the *Halmaturus*, with the same general type, had less relative antero-posterior extent, and had not the smaller deep-seated transverse ridges; the bony palate also, as in other Wallabies, presented a pair of large vacuities. Subsequently³ I was enabled to show a more marked generic distinction in the form, sculpturing, and proportions of the upper and outer (third) incisor.

In 1874, M. D'Albertis described and figured a small existing kind of Kangaroo under the name of *Halmaturus luctuosus*⁴, obtained

¹ Phil. Trans. 1874, p. 272, pl. xxvii. figs. 5-9.

² Lesson, not Gray; the latter is probably a variety of *Halmaturus ruficollis*, Desm.

³ Phil. Trans. 1876, p. 211, pl. xxv. figs. 2, 3, pl. xxviii. figs. 1, 3.

⁴ Proceedings of the Zoological Society, 1874, p. 110, et p. 247, pl. xlii.

in the south-east of New Guinea, with a premolar more trenchant than in *Sthenurus*, and with the proportions of the tooth differing in the opposite extreme of fore-and-aft extent, and in greater degree than in *Halmaturus*, from those of the premolar of *Sthenurus*. This rare Kangaroo was deposited in the Zoological Gardens, and on its death, in November 1874, was anatomized by the accomplished prosector, A. H. Garrod, B.A., by whom the skull and teeth are well described and figured¹. The state of dentition on both sides of the upper jaw is that shown on the left side of the fossil above described; the premolar is in place, and the last molar partially extricated from its formative alveolus. Prof. Garrod refers the species to the same genus as the *Dorcopsis muelleri* of Schlegel.

The premolar of *Dorcopsis luctuosus* shows an antero-posterior extent of crown relatively greater than in *Sthenurus*; it develops a single trenchant ridge, forming the main part of the body and summit of the crown, being supplemented on the outer and inner sides by a subtubercular basal ridge or cingulum. The antero-posterior extent of the premolar in the larger kinds of *Sthenurus* does not exceed that of the contiguous molar, *d* 4, and one half of the next molar, *m* 1; in *Sthenurus minor* (Plate XXXVII. fig. 3, *p* 3) its extent is relatively less; in *Dorcopsis* it exceeds that of the two succeeding molars and a little over (P. Z. S. 1875, plate vii. figs. 2 and 3). In all the species of *Sthenurus* the outer ridge of the premolar rises directly from the base of the crown (Plate XXXVIII. figs. 1, 5, 12, *p* 3), and inclines so little inwards that its summit as well as base is on the outer side of the working surface of the tooth (ib. figs. 3, 7, 14, *p* 3, *d*); in *Dorcopsis* there is a series of small prominences, a tuberculate cingulum, on the outer side of the base of the outer ridge, and the trenchant margin of this ridge (through its greater inclination inwards) traverses the middle of the working surface of the tooth². The tubercular character of the inner ridge in *Dorcopsis* seems a repetition, on that side, of the tubercular cingulum on the outer side of the base of the crown. In *Sthenurus* the transverse thickness of the premolar decreases as the crown extends forward; in *Dorcopsis* the transverse thickness is uniform, or is maintained to very near both ends of the crown (comp. *tom. cit.* plate vii. fig. 2 with Plate XXXVIII. figs. 3, 7, 14, *p* 3).

The broadest (hindmost) part of the premolar in *Sthenurus* (Plate XXXVIII. figs. 7, 14, *p* 3, *c*) is not quite equal to that of the fore lobe of the contiguous molar (ib. *d* 4), and is markedly inferior to that of the next (second) molar (Plate XXXVII. fig. 1, *m* 1); in *Dorcopsis* the breadth of the base of the premolar equals that of the next and following molars (*d* 4).

The post-internal tubercle of the premolar of *Sthenurus* is united by a transverse ridge with the hind summit (Plate XXXVIII. figs. 6, 7, 13, 14, *c*) of the outer longitudinal lobe or plate (*d*). The corresponding tubercle in *Dorcopsis* is not so united with the homo-

¹ P. Z. S. 1875, p. 48, pls. vii., viii., ix.

² Hence Prof. Garrod describes the crown of the tooth as "prismatic in shape," *loc. cit.* p. 54.

logous, but here median, longitudinal ridge. In sum, the upper and long premolar in *Dorcopsis*, like that of the short premolar of *Dendrolagus*, is generically distinct in its modifications from that of the premolar in the three known species of *Sthenurus*.

In the upper molars of *Sthenurus* the prebasal ridge is relatively larger than in *Dorcopsis* and *Dendrolagus*, the mid link is better developed; there is an increase of breadth from the first (d_1) to the third (m_2) molar in *Sthenurus* not shown in *Dorcopsis* (comp. figs. d_4 , m_3 in Plate XXXVII. with fig. 2, pl. vii. P. Z. S. 1875).

The generic type of the lower premolar is still more marked in *Dorcopsis* (ib. plate vii. fig. 3) and *Dendrolagus* as compared with its homologue in *Sthenurus* (Plate XXXVIII. figs. 9, 10, 16, 17); this is manifested in the latter genus by the bilobed character of the outer surface, conspicuously shown in the unworn, unexcladed crown of the tooth in the type species of the genus (*Sthenurus atlas*)¹.

In *Dorcopsis* the outer surface, like the inner one, of the lower premolar retains the simple vertically grooved surface as in the Potoroo type (*Hypsiprymnus*). The tendency to that modification of Macropodal structure is further shown by the retention of the canines, though minute, in the upper jaw, by the predominance in size of the foremost upper incisor, i_1 , and the production of its cutting surface beyond or below the horizontal line of wear of the two following incisors (i_2 , i_3). The canines are relatively larger in *Dendrolagus*, as in the *Hypsiprymniæ*.

I have not found an upper canine in a *Sthenurus* of any age. In the fossil of the young *Sthenurus atlas* (the subject of plate xxv. fig. 2, Phil. Trans. 1876), with the dentition less advanced than in the present evidence of *Sthenurus minor*, the maxillo-premaxillary suture shows no trace of such tooth or of any socket of a shed rudiment; yet the foremost incisor was not fully in place, and the crown of the third incisor required for exposure the removal of the premaxillary alveolar wall. The character of the crown of i_3 , so detected, enabled me to determine the detached homologous teeth of old individuals of *Sthenurus atlas*. In all the pattern is distinct from that of i_3 in either *Dorcopsis* or *Dendrolagus*. Subsequent acquisitions of premaxillaries and their teeth of the larger species, *Sthenurus brehus*, showed the same generic character (plate xxviii. figs. 1, 3, i_1 , i_2 , i_3 , Phil. Trans. 1876). The outer or labial surface of the crown of i_3 is equally bisected by a subvertical linear groove or enamel-fold; the fore-and-aft breadth of the unworn crown exceeds that which appears in the side view of i_1 (Plate XXXVIII. fig. 11) in *Sthenurus atlas*, and equals the total breadth of that tooth. The three incisors on each side work on the same horizontal level.

In all these characters *Sthenurus* deviates from the Halmaturine, *Dorcopsine*, and *Hypsiprymnine* types, and approaches that of the great Kangaroos represented by *Macropus* proper, *Osphranter*, and *Boriogale* (Phil. Trans. 1874, plate xx. figs. 17, 18, 19).

¹ Mitchell's 'Three Expeditions into the Interior of Eastern Australia,' Svo, 1838, plate xxix. fig. 1; Phil. Trans. 1874, pl. xxii. figs. 4, 5, 6, p 3, pl. xxiv. fig. 7, p 3.

What evidence, it may be asked, does the skeleton afford of the affinities of the huge extinct Kangaroos of the genus *Sthenurus*? I am able only to adduce those yielded by the skull. The time may arrive when, in some Australian cavern, a greater proportion of the enduring framework may be recovered in connexion with the skull and dentition of one and the same individual. Fortunately the cranial characters at present known are instructive ones, are well shown in the portion of skull of the smaller species under description, and the more welcome as repeating those previously given by a corresponding portion of a skull of *Sthenurus brehus* (Phil. Trans. 1874, plate xxviii. fig. 6). The first of these characters is the integrity of the bony palate. In *Dorcopsis* (P. Z. S. 1875, plate vii. fig. 2), as in the Hypsiprymninæ, and as in most of the smaller Kangaroos which have been grouped under the less-definite genera *Halmaturus*, *Petrogale*, *Lagorchestes*, the bony palate shows two or more large vacuities¹. In *Dendrolagus* the palate is entire, as in *Macropus* and *Sthenurus*. The masseteric process is short in *Dorcopsis*, as in the Hypsiprymuines; it is long in *Sthenurus*, as in *Macropus*.

The relative position of the masseteric process to particular molar teeth, outside which it descends, varies at different phases of the acquisition of the molars. In *Sthenurus* it is always opposite the interspace between the penultimate and last molar "in place." Thus in the immature specimen of *Sthenurus minor*, in which *m* 3 is not extricated, the process is opposite the interspace between *m* 2 and *m* 1; in the mature *Sthenurus brehus*² it is opposite the interspace between *m* 2 and *m* 3. In the specimen with *m* 3 in place, but less mature in age³, the process is opposite a larger proportion of *m* 2, though partly hiding the interspace between it and *m* 3. The relative position of the masseteric process, described as a differential character between *Dorcopsis luctuosa* and *D. muelleri*⁴, may depend upon the incomplete development of *m* 3 in the subject of Prof. Garrod's plate vii. fig. 3 (*loc. cit.*).

The forward movement of the molar series is effected by that of their sockets; but the superincumbent pier of the zygoma does not participate in the molecular additions and subtractions to which that movement of the dental cases is due. Such movement is most striking, and was first impressed upon my mind as the true dynamic in the change of place of growing teeth, in the jaws of the Elephant,

¹ The characters of the bony palate are defined and exemplified in the plates of the papers "On the Osteology of the Marsupialia," in the Trans. Zool. Soc. In vol. ii. pl. lxxi. fig. 5, the vacuities are shown in *Halmaturus bennettii* (a nearly, if not a local variety of *Halm. ruficollis*, Gould); in vol. ix. pl. lxxiv. the entire condition of the palate is shown in *Macropus (Osphranter) rufus*.

² 'Researches on the Extinct Mammals of Australia,' 4to, 1877, vol. ii. pl. lxxxviii. fig. 6.

³ *Ibid.* pl. cviii. figs. 1, 21.

⁴ "In *D. luctuosa* the apex of the 'angular process which is developed downwards from the inferior margin of the maxillary portion of the zygoma' is opposite the anterior cusp of the third molar tooth, whilst in *D. muelleri* it corresponds to the posterior cusp of the second molar" (p. 52). In the specimen, as in the 'plate vii,' the tip of the masseteric process is opposite the interspace between the two lobes of *m* 1.

in which, as is well known, the true molars (a backward continuation of the deciduous series) are always on the move in a curve from behind forward, and are shed in front as they are developed behind. The sockets or cases of the huge complex grinders are more distinct, as such, from the surrounding maxillary or mandibular bones, than in other mammals¹. This dynamic has been well exemplified as efficient in the vertical movements of permanent incisors and canines of the human subject by the present Lecturer on Dental Surgery at St. Bartholomew's Hospital, Mr. Alfred Coleman².

Such are the grounds which oppose my acceptance of the conclusions of a fellow labourer whose opinion I value. Prof. Garrod expresses them as follows:—

“An inspection of the plates in Prof. Owen's paper on these new genera (Phil. Trans. 1875, p. 245) makes it evident that they are scarcely distinguishable from *Dendrolagus*, and must be included in the *Dorcopsis* section of the family.”

The genera alluded to are those defined in the Philosophical Transactions, 1874, p. 245 *et seq.*, under the names *Protemnodon* and *Sthenurus*.

Professor Garrod assigns no grounds for their necessary inclusion in the section cited; if he should be disposed to define them they will receive my due attention.

In such inquiries and comparisons I would venture to express the advantage I have derived from definite conclusions as to the homologies of the teeth, resulting in a power of defining them individually by symbols; for whether such symbols be accepted or not, they briefly but unmistakeably show the writer's meaning. In the quotation (P. Z. S. 1875, p. 52) relative to the position of the masseteric process, one could not be sure which molar Prof. Garrod meant without referring to the plate vii. And again, in the description of his plate ix. (P. Z. S. 1875), the author writes:—“the third and fourth rows the upper and lower third left molar” (p. 59). Counting the molars from before backwards the third would be the penultimate one. Comparing the figures with the original specimen now in the British Museum I find fig. 3 most resembling, in the relative size of the hinder lobe, the last of the molar series, viz. the fourth, counting backward; but this is the homologue, in my view, of the third true molar in the typical diphyodont dentition, consequently bearing the symbol m_3 in Plate XXXVIII. figs. 8, 15, of the present paper.

But if the molar tooth, fig. 3 in Prof. Garrod's plate, be the homologue of figs. 8 and 15 in mine, it yields a comparison bearing on the question at issue. In many Wallabies, as in the Potoroos (*Hypsiprymninæ*) the last molar, m_3 , differs from that in *Macropus* proper and in *Sthenurus* by its smaller relative size, especially of its hinder lobe; and I see in this character of *Dorcopsis*, associated as

¹ “The bony plate (ib. fig. 2 *a*) forming the sockets of the growing teeth is more than usually distinct from the body of the maxillary, and participates in this revolving course, advancing forwards with the teeth.” (‘Odontography,’ 1840–45, p. 639.)

² St. Bartholomew's-Hospital Reports, vol. xii. p. 92.

it is with the characters of the long trenchant premolars, the retained canines, the produced anterior incisors, and the palatal vacuities, an addition to those evidences of the departure of the genus from *Macropus* proper and *Sthenurus*, and of its approximation to *Hypsiprymnus*.

It may be that the grounds of my homologies of the teeth of Macropodidæ are not deemed conclusive. They are as follows, and I am open to any objections which may have barred Prof. Garrod's acceptance of them.

In the subjoined cut, A represents the dental series, deciduous and permanent, exposed in the right mandibular ramus of a young

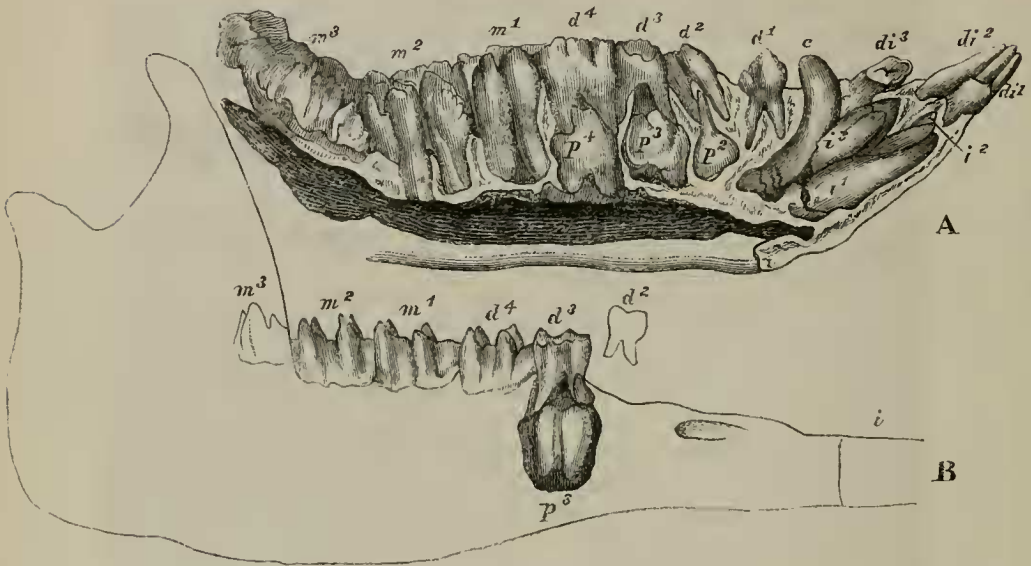


Fig (*Sus scrofa*, L.); B represents the same in a young Kangaroo (*Macropus major*, Shaw).

In place of the incisors *di* 1, *di* 2, *di* 3, and of the canines, *c*, in the Pig (A), we have the single incisor, *i*, in the Kangaroo (B), which may be the homologue of *i* 1 in the Pig. Of the tooth *d* 1 in the Pig there is no homologue in the Kangaroo. The small foremost molar, *d* 2, in the Kangaroo, I view as the homologue of *d* 2 in the Pig; but in the Pig there is a vertical successor, *p* 2, which is not developed in the Kangaroo. The tooth *d* 3 in the Kangaroo is the homologue of *d* 3 in the Pig: in both it has a vertical successor—a true 'pre-molar,' *p* 3, which displaces it usually, in *Macropus major*, a short time after the fall of *d* 2; and this premolar rises into place, like *p* 3 in the Pig, without displacing the tooth *d* 4. Beneath *d* 4, in the Kangaroo, there is no vertical successor—no *p* 4 as in the Pig; and in this respect *d* 4 in the Kangaroo resembles *d* 2. These homologies being determined, or accepted, those of *m* 1, *m* 2, *m* 3, with the molars similarly symbolized in the Pig, follow as a matter of

course. The condition of d_4 in the Kangaroo adds to the characters which have led odontologists to regard the three "true molars" of the diphodont mammals, as being essentially a backward continuation of the first or deciduous series of teeth. With respect to d_2 , in *Macropus*, F. Cuvier remarks¹:—" Dans le jeune âge, la première mâchelière est mince et analogue aux fausses molaires des genres précédens" (*Halmaturus*, *Hypsiprymnus*). "A mesure que les dents postérieures se développent, les antérieures qui sont usées et qui sont poussées en avant par les premières, s'oblitérent et tombent de manière qu'elles finissent par se réduire à trois. Ainsi les premières ne sont pas, comme chez les halmatures, remplacées par des dents qui se développent sous elles, mais par les dents qui se sont développées derrière elles."

Now, if this statement of the distinguished odontologist (to whom we are indebted for the first work containing figures and formulæ of the teeth of the class Mammalia as then known) had been founded on fact, the distinction of *Sthenurus* from *Macropus* and its concomitant resemblance to *Dorcopsis* would have been as great as Prof. Garrod seems to have concluded. The mistake may have arisen from F. Cuvier having limited his quest to the part of the jaw immediately beneath the slender 'première mâchelière' (d_2 , B, in fig. 1). But had he carried the investigation further back he would certainly have come upon the vertical successor, p_3 , of d_3 , which he so well describes as characterizing his (not Illiger's) genus *Halmaturus*². This procedure I practised in comparing, for description in the 'Appendix' to Mitchell's 'Three Expeditions' &c., the fossil remains from Australia, which that early and distinguished explorer of the continent brought to England and submitted to me in 1836; and thus I became aware of F. Cuvier's mistaken view of the generic character of *Macropus*, and was led to the discovery of the immaturity of the individual Macropodidæ of which portions of the fossil mandible and teeth seemed to represent full-grown Kangaroos of larger size than the largest known living specimen, called on that account *Macropus major*.

Later investigations of the fossil marsupials of Australia have led to the interesting result, that the developmental condition which F. Cuvier believed to differentiate the larger Kangaroos of the genus *Macropus* from the smaller kinds referred to *Halmaturus* and *Hypsiprymnus* does actually differentiate the huge extinct herbivorous marsupials of the genera *Nototherium* and *Diprotodon* from the Macropodidæ, which we now know to have been represented by species much exceeding in size the existing Kangaroos. Moreover, the large extinct Kangaroos, even in the partial degree in which we have already come to know them, manifest much better grounds for generic or subgeneric distribution than do any of the existing forms. And such extinct genera, represented as they are by species

¹ 'Des Dents des Mammifères,' 8vo, 1825, p. 133.

² *Op. cit.* p. 136. Mr. Waterhouse has given good illustrations of the deciduous and permanent premolars of *Hypsiprymnus*, in plate x. figs. 2, 4, of his 'Natural History of the Mammalia,' 8vo, 1845, p. 194.

larger than the existing kinds, manifest in a highly interesting and suggestive way an approximation to the Notothere and Diprotodons.

In *Nototherium*, although the premolar (by position) is characterized by an outer and an inner plate, antero-posteriorly disposed¹; yet the transverse breadth of the tooth is proportionally so much greater than the fore-and-aft length, and the connecting ridges of the two plates, through the folding of the inner one, are so large, that the hind part of the premolar already assumes the character of a lobe of the transversely ridged dilophodont molars. In *Diprotodon* the dilophodont character is better shown², and the premolar (by position) is the first of the series of such molars, differing only in its inferiority of size. The qualification "by position" means that the tooth is not a veritable premolar, it never displaced vertically a deciduous predecessor, either in *Nototherium* or *Diprotodon*, but is the homologue of *d* 3 in the Pig and Kangaroo.

Macropus, *Sthenurus*, *Procoptodon* exemplify stages of transition to the exclusively vegetarian character of the molar series exemplified by *Diprotodon*. The genera *Halmaturus*, *Dorcopsis*, *Dendrolagus*, *Hypsiprymnus* exemplify as many stages in the modification of the teeth for a mixed diet, which, in the Diprotodont series of Marsupialia, culminated carnivorously in *Thylacoleo*. Here the upper anterior incisors, *i* 1, acquired their largest proportional size with the change of the trenchant for the piercing or laniary type. The single lower pair of incisors underwent the same modifications. The conversion of the premolar, in size and shape, to a carnassial tooth, and the reduction of the molars in number and size to the tubercular condition of the feline molar, are exemplified, in *Thylacoleo*, with corresponding figures of the jaws and teeth of our Cave-Lion and Cave-Hyæna, in plate vi. of my 'Researches on the Fossil Mammals of Australia.' In this work a preliminary chapter is devoted to the extinct Marsupials of England, in which it is shown that, at the oolitic period, our Marsupials had also diverged, by modifications of the fundamental type, into species exemplifying the 'polyprotodont'³ and the 'diprotodont'⁴ suborders — and that, in the formal or adaptive characters of the teeth, species diverged from the common carnivorous or insectivorous types exemplified in *Stylodon*⁵ and *Thylacotherium*⁶, to the vegetarian type in *Bolodon*⁷ and *Stereognathus*⁸ in one direction, and to the carnivorous type exemplified by *Triconodon* and *Plagiaulax*, in the opposite route.

EXPLANATION OF THE PLATES.

PLATE XXXVII.

Sthenurus minor, Ow.

Fig. 1. Palatal surface of skull with right and left molar series.

2. Outer side view of alveolar part of the right maxillary, with the molar series *in situ*, and the undeveloped premolar exposed in its formative cell.

¹ 'Researches,' &c. vol. ii. pl. lxxxviii. figs. 11–16.

² *Ibid.* pl. cxxiv. *d* 3.

³ *Ibid.* pl. ii. fig. 17.

⁴ *Ibid.* pl. iv. fig. 16.

⁵ *Ibid.* pl. ii. fig. 14.

⁶ *Ibid.* pl. i. fig. 23.

⁷ *Ibid.* pl. iii. fig. 5.

⁸ *Ibid.* pl. iv. figs. 9–15.